

HATCHERY AND GENETIC MANAGEMENT PLAN  
(HGMP)

DRAFT

Hatchery Program	Warm Springs National Fish Hatchery
Species or Hatchery Stock	Warm Springs River Spring Chinook Salmon
Agency/Operator	USFWS
Watershed and Region	Deschutes River
Date Submitted	nya
Date Last Updated	nya

Section 1: General Program Description

1.1	Name of hatchery or program.
1	Warm Springs National Fish Hatchery
1.2	Species and population (or stock) under propagation, and ESA status.
1	Warm Springs River Spring Chinook Salmon

9

ESA Status: Not listed and not a candidate for listing

1.3 Responsible organization and individuals.

3

**Name (and title):** Michael L. Paiya  
Project Leader

**Agency or Tribe:** USFWS - Warm Spring NFH

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**Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.**

4

Co-operators	Role
Confederated Tribes of the Warm Springs Reservation of Oregon	Fisheries Co-manager
USFWS	Hatchery Operator, Fisheries Co-manager
ODFW	Fisheries Co-manager
nya	nya

1.4 Funding source, staffing level, and annual hatchery program operational costs.

5

Funding Sources
USFWS
nya
nya
nya
nya
nya
nya

6

Operational Information	Number
Full time equivalent staff	6
Annual operating cost (dollars)	538000

Comments:

text from HGMP 10 October 2002:

The Warm Springs NFH is fully funded by the USFWS. The hatchery has a staff of six full time employees and has an annual operating budget of \$538,000.

Reviewer Comments:

nc  
nc

Data source:

1.5

Location(s) of hatchery and associated facilities.

Broodstock source	Warm Springs NFH
Broodstock collection location (stream, Rkm, subbasin)	at Hatchery Rkm 16
Adult holding location (stream, Rkm, subbasin)	Warm Springs NFH
Spawning location (stream, Rkm, subbasin)	Warm Springs NFH
Incubation location (facility name, stream, Rkm, subbasin)	Warm Springs NFH
Rearing location (facility name, stream, Rkm, subbasin)	Warm Springs NFH

Comments:

text from HGMP 10 October 2002:

Warm Springs National Fish Hatchery is located at Rkm 16 of the Warm Springs River, within the Warm Springs Indian Reservation. The Warm Spring River enters the Deschutes River at Rkm 135, which in turn enters the Columbia River at Rkm 329. The hatchery site lies in Section 24, Township 8 South, Range 12 East, Willamette Meridian, Oregon. Shitike Creek enters the Deschutes River at Rkm 174 after flowing approximately 61 km from its headwaters near Mt. Jefferson.

Data source:

nds

1.6

Type of program.

Integrated

Comments:

Data source:

1.7

Purpose (Goal) of program.

9

The purpose of this hatchery program is to provide harvest , to contribute to conservation/recovery and research and education.

10

the purpose of the program is mitigation for \*\* NO STATEMENT PROVIDED FOR THIS CHOICE \*\*.

Comments:

text from HGMP 10 October 2002:

The goals of the Warm Springs National Fish Hatchery (NFH) spring Chinook program are as follows:

- 1.) Augment wild fish runs in the Warm Springs River in order to provide a sustainable harvest of hatchery spring Chinook salmon for the CTWSRO.
- 2.) Restore spring Chinook salmon populations in Shitike Creek.
- 3.) Research techniques for integrating wild and hatchery fish in a way that maintains the biological and genetic characteristics of fish populations in both the hatchery and stream environments.

Honor Federal governmental responsibility to the Warm Springs Tribe as per treaty

Data source:

1.8

Justification for the program.

- 138
- Hatchery fish accessible to fisheries because the fish produced are differentially marked to enable selective harvest.
  - Hatchery fish accessible to fisheries because the fish produced are available in sufficient number to the fisheries (location, time, gear) that are intended to benefit from the program (i.e. to meet the harvest goals).

Comments:

Honor Federal governmental responsibility to the Warm Springs Tribe as per treaty

text from HGMP 10 October 2002:

In 1959, the USFWS, responding to a request by the CTWSRO, began investigating salmon and steelhead enhancement possibilities on Warm Springs Reservation waters. In 1966 Congress authorized the construction of Warm Springs National Fish Hatchery (NFH) in order to enhance anadromous fish runs in Reservation waters and meet the future needs of the resource as well as those of the Tribe. Full production at the hatchery began in 1978. The USFWS and the CTWSRO have cooperatively managed the Warm Springs NFH in a manner that will provide harvest opportunities for hatchery spring Chinook salmon while protecting wild fish populations in the subbasin.

nc  
nc  
nc

Data source:

nds  
nds  
nds

nds

11

1.9

List of program "Performance Standards".

The program adheres to the following fish culture guideline(s) and standard(s):

IHOT

PNFHPC

tribal

federal

other

**Comments:**

Hatchery Specific Developed Guidelines

**Data source:**

Warm Springs National Fish Hatchery Operational Plan and Implementation Plan 2002-2006

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1.10

List of program "Performance Indicators", designated by "benefits" and "risks".

Indicators of Harvest Benefits		
Indicator	Performance Standard	Indicator is Monitored
Spawner to spawner survival of hatchery fish	nya	nya
Contribution of hatchery fish to target fisheries	1620	Y
Angler success (hatchery fish per angler day) in target recreational fisheries	nya	nya
Contribution of hatchery fish to cultural needs	630	Y
Selective harvest success (expected benefits of mass marking)	nya	nya
Indicators of Conservation Benefits		
Indicator	Performance Standard	Indicator is Monitored
Genetic and life history diversity (over time)	No Change	No Change
Spawner to spawner reproductive success of hatchery fish	nya	nya
Reproductive success of the receiving (supplemented) naturally spawning population	nya	nya
Contribution to the abundance of the naturally spawning population	1,300 wild spawners	Y
Time and location of spawning	No change From Historic	Y
Contribution to ecosystem function (e.g. through nutrient enhancement, food web effects, etc.)	nya	nya
Indicators of Harvest Risks		
Indicator	Performance Standard	Indicator is Monitored

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<b>Harvest impacts on co-mingled stocks</b>	nya	nya
<b>Bias in run size estimation of natural stocks due to masking effect</b>	nya	nya
<b>Lack of harvest access (under harvest due e.g. to co-mingling with weaker stocks)</b>	nya	nya

#### Indicators of Conservation Risks

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Indicator	Performance Standard	Indicator is Monitored
<b>Unintended contribution of hatchery fish to natural spawning (through straying)</b>	nya	nya
<b>Loss of genetic and life history diversity</b>	No Change	Y
<b>Loss of reproductive success</b>	nya	nya
<b>Ecological interactions through competition with natural stocks (by life stage)</b>	nya	nya
<b>Ecological interactions through predation on natural stocks (by life stage)</b>	nya	nya
<b>Adverse effects of hatchery operations and facilities on fish migration Disease transfers</b>	nya	nya

The following plans and methods are proposed to collect data for each Performance Indicator: 1) A subsample of wild and hatchery fish are biosampled in order to collect length, age, sex, and coded-wire tag information for adult fish. The USFWS operates a fish barrier dam and adult fish ladder adjacent to the fish hatchery on the Warm Springs River. Approximately 10% of the wild run and 40% of the hatchery run are sampled at the hatchery. The CTWSRO operates a migrant traps downstream of the hatchery on the Warm Springs River and near the mouth of Shitike Creek that monitor juvenile outmigration timing of wild and hatchery fish.

Run timing of wild spring Chinook salmon is monitored at the hatchery fish ladder. Broodstock for the hatchery program are collected based on historical run timing averages of the wild run.

Creel surveys conducted by the CTWSRO and the Oregon Department of Fish and Wildlife (ODFW), coded-wire tag recoveries, and hatchery returns are used to estimate the contribution of Warm Springs NFH spring Chinook salmon to various fisheries.

Adults are selected for outplanting in Shitike Creek at spawn time in the hatchery. Redd surveys, radio-telemetry, genetic surveys, and juvenile monitoring will be used to evaluate the contribution of Warm Spring NFH spring Chinook salmon to natural production in Shitike Creek.

Specialists from the Lower Columbia River Fish Health Center (LCRFHC) will inspect adult broodstock yearly and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, the LCRFHC will recommend remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary.

Three to six weeks prior to release or transfer, 60 fish from each lot will be given a health exam by fish health specialists from the LCRFHC. All juvenile fish at the hatchery are externally marked and coded-wire tagged (CWT) prior to release. Juvenile fish are sampled by the USFWS for mark quality and tag retention prior to release. The tag retention goal at release is a minimum of 95%.

Smolt to adult survival rates are estimated for each brood year. Creel surveys conducted by CTWSRO and ODFW sample fish caught in fisheries in the Deschutes River. A subsample of hatchery spring Chinook salmon returning to the hatchery are biosampled. Coded-wire tag recoveries are used to estimate the age structure of returning fish.

Wild spring Chinook salmon abundance is monitored as fish pass through the fish ladder at Warm Springs NFH. The CTWSRO and USFWS will conduct redd surveys in order to estimate spawning abundance.

During the steelhead migration period all fish are sorted by hand. All hatchery steelhead, identified as having missing or deformed fins, are killed at the hatchery and distributed to the CTWSRO. All wild steelhead are passed upstream. The disposition of each fish handled is recorded in fish removal database files maintained by the USFWS Columbia River Fisheries Program Office.

Fish passed upstream are monitored either manually or through a video-monitor system.

All carcasses are screened by the fish health center for disease prior to being outplanted into the stream. Carcasses are treated (by evisceration and heat-baking) to prevent potential disease transmission.

Monitoring programs will be incorporated into project designs. Examples of project designs include diet studies, rearing density studies, and rearing environment projects.

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Effectively communicate with other salmon producers, managers, and the public in the Columbia River Basin.

Environmental monitoring of total suspended solids, settleable solids, in-hatchery water temperatures, in hatchery dissolved oxygen, nitrogen, ammonia, and pH is conducted annually at the hatchery.

Trapping efficiency is evaluated on a regular basis. During efficiency testing upstream bound fish will be held overnight and then manually examined for fin clips and the presence of coded-wire tags. Video monitoring is used to estimate wild fish passage above the hatchery.

The CTWSRO and USFWS formulate a pre-season run prediction for Warm Springs River stocks returning to the Deschutes River. The CTWSRO and ODFW co-manage and monitor the fishery in order to ensure that impacts to wild fish are minimized.

A juvenile trap located downstream of Warm Springs NFH monitors the outmigration of hatchery and wild fish. Juvenile releases may also be monitored using radio telemetry, PIT tagging, snorkeling, trapping, or other techniques.

Coded-wire tag recoveries throughout the Columbia basin are recorded and summarized in order to estimate the amount of straying of Warm Springs NFH spring Chinook salmon.

Screens are monitored by hatchery personnel on a regular basis.

Juvenile fish health is monitored on at least a monthly basis at the hatchery in order to detect potential disease problems. A fish health specialist will examine affected fish and make recommendations on remedial or preventative measures. Therapeutic and prophylactic treatments will be administered upon consultation with the fish health specialist and in accordance with USFWS and the Integrated Hatchery Operation Team’s policies. Wild fish used in the broodstock are checked for disease. Wild fish juveniles in the stream are periodically checked, as identified in the hatchery operations plan.

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The program contributes to information gain in the following way(s): Hatchery program contributes to research to improve performance and cost effectiveness  
New information affects change to the hatchery program through a structured adaptive decision making process  
Hatchery program participates in basin wide-coordinated research efforts  
Hatchery program actively contributes to public education  
Funding for monitoring of performance indicators is adequate

Comments:

Contribution of Hatchery fish to target fisheries is for in Deschutes River harvest only

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Data source:

nds  
nds  
nds  
nds  
nds  
Draft HGMP

1.11.1

Proposed annual broodstock collection level (maximum number of adult fish).

198

nya

Data source:

nds

1.11.2

Proposed annual fish release levels (maximum number) by life stage and location.

				Location			
Age Class	Maximum Number	Size (ffp)	Release Date	Stream	Release Point (RKm)	Major Watershed	Ecoprovince
Eggs	0	nya	nya	nya	nya	nya	nya



1

Unfed Fry	0	nya	nya	nya	nya	nya	nya
Fry	0	nya	nya	nya	nya	nya	nya
Fingerling	75000	6-22	Oct - Nov	Warm Springs	16	Deschutes River	Columbia Plateau
Yearling	750000	9-22	Mar - Apr	Warm Springs	16	Deschutes River	Columbia Plateau

Comments:

nc

Data source:

nds

1.12 Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

33

Return Year	Total Catch (all ages)	Natural Escapement		Hatchery Spawning	
		NoRs	HoRs	NoRs	HoRs
Goal	nya	nya	nya	nya	nya
1990	6	1767	0	5	1390
1991	9	816	0	1	634
1992	137	973	0	89	766
1993	126	534	0	4	308
1994	15	435	0	0	62
1995	nya	235	0	2	289
1996	nya	1245	0	42	734
1997	nya	867	113	3	922
1998	nya	271	21	0	624
1999	nya	492	32	2	2676
2000	nya	2630	285	73	6300
2001	nya	2193	303	59	4163

Comments:

nc

Data source:

Draft HGMP

Status and Goals of Stocks and Habitats

	NoRs		HoRs		Combined (HoRs + NoRs)		
	Brood Year	Smolt to Adult Survival(%)	Recruits per Spawner	Smolt to Adult Survival(%)	Recruits per Spawner	Smolt to Adult Survival(%)	Recruits per Spawner
	Goal	nya	nya	nya	nya	nya	nya
	1988	1.78	2.65	0.1825	1.79	nya	nya
	1989	0.69	0.82	0.0201	0.21	nya	nya
	1990	0.40	0.52	0.0049	0.04	nya	nya
	1991	0.37	0.28	0.0167	0.22	nya	nya
	1992	2.57	4.11	0.1582	1.58	nya	nya
	1993	2.68	3.55	0.2678	4.10	nya	nya
	1994	0.46	0.99	0.1436	1.94	nya	nya
	1995	12.95	4.54	0.4120	7.30	nya	nya
	1996	2.27	6.09	0.5889	14.35	nya	nya
	1997	nya	nya	0.2407	nya	nya	nya
	1998	nya	nya	0.0558	nya	nya	nya
	1999	nya	nya	nya	nya	nya	nya

Comments:

Limited data for HoRs SAR from CWT missing production groups for Warm Springs NFH fish released in the Warm Springs River; 1996-1999 incomplete data

Data source:

Annual Coded Wire Tag Program Missing Production Groups (USFWS), 1997 NOR and HOR R/S from Draft HGMP.

1.13 Date program started (years in operation), or is expected to start.

7 The first year of operation for this hatchery was 1979 .

Comments:

text from HGMP 10 October 2002:

Full production at Warm Springs NFH began in 1978.

Data source:

1.14 Expected duration of program.

148 The final year of the program is undetermined.

149 The program is on-going with no planned termination.

Comments:

nc  
nc

Data source:

nds  
nds

1.15 Watersheds targeted by program.

1Deschutes River

1.16 Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

The hatchery program is a part of a strategy to meet conservation and/or harvest goals for the target stock. The tables below indicate what the short- and long-term goals are for the stock in terms of stock status (biological significance and viability), habitat and harvest. The letters in the table indicate High, Medium, or Low levels for the respective attributes. Changes in these levels from current status indicate expected outcomes for the hatchery program and other strategies (including habitat protection and restoration).

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Biological Significance			Viability	Habitat
Current Status	H		H	M
Short-term Goal	M		H	M
Long-term Goal	L		H	H

This table shows current status and goals for harvest opportunity. **H** implies harvest opportunity every year, **M** opportunity most years, **L** some years, and **N** no opportunity.

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Location of Fishery						
Fishery type		Marine	L. Columbia	Zone 6	U. Columbia	Subbasin
Commercial	Current Status	N	N	H	nya	nya
	Short-term Goal	N	N	H	nya	nya
	Long-term Goal	N	M	H	nya	nya
Ceremonial	Current Status	nya	nya	H	nya	M
	Short-term Goal	nya	nya	H	nya	H
	Long-term Goal	nya	nya	H	nya	H
Subsistence	Current Status	nya	nya	H	nya	M
	Short-term Goal	nya	nya	H	nya	H
	Long-term Goal	nya	nya	H	nya	H
Recreational	Current Status	N	N	nya	nya	M
	Short-term Goal	N	L	nya	nya	H
	Long-term Goal	N	L	nya	nya	H
Catch and Release	Current Status	nya	nya	nya	nya	M
	Short-term Goal	nya	nya	nya	nya	M
	Long-term Goal	nya	nya	nya	nya	M

**Opportunities to reduce risk and/or increase survival of the target population or increase program efficiency include:**

**HGMP:**

- NOAA Fisheries Program Designation: Warm Springs NFH Spring Chinook
- (Alternative and Reform/Investment) Dam Removal
- (Alternative) Marking
- (Alternative) Importing Other Stocks to Basin
- (Alternative) Stock Transfers to Other Watersheds
- (Alternative) Disinfection, Chilling, and Water Re-Use Infrastructure
- (Reform or Investment) Stock Transfers / Supplementation / Terminal Fisheries
- (Reform or Investment) Ozone, Chilling, Re-Use Infrastructure
- (Reform or Investment) Ozone, Chilling, Re-Use Annual O&M

**APRE:**

- APRE Form Program Designation: Deschutes-Warm Springs Spring Chinook-Integrated
- Hatchery intake screening for the adult holding supply should comply with Integrated Hatchery Operations Team (IHOT) and National Marine Fisheries Service facility standards.
- The water used for adult holding should meet or exceed the recommended Integrated Hatchery Operations Team (IHOT) water quality standards for temperature.
- IHOT species-specific incubation recommendations should be followed for water temperature.
- Hatchery intake screening for the incubation water supply should comply with Integrated Hatchery Operations Team (IHOT) and National Marine Fisheries Service facility standards.
- IHOT species-specific incubation recommendations should be followed for using substrate.
- The water used for rearing should meet or exceed the recommended Integrated Hatchery Operations Team (IHOT) water quality standards for temperature.
- Hatchery intake screening for the rearing water supply should comply with Integrated Hatchery Operations Team (IHOT) and National Marine Fisheries Service facility standards.
- The water used for rearing should provide natural water temperature profiles that result in fish similar in size to naturally produced fish of the same species.
- The program should attempt to better mimic the natural stream environment by rearing under natural water temperature profiles.
- IHOT juvenile rearing standards should be followed for alarm systems.
- Fish produced should be qualitatively similar to natural fish in growth rate.
- Fish produced should be qualitatively similar to natural fish in physiological status.
- Fish should be released at an optimum time and size that has been determined by a site-specific survival study.
- Marking/tagging techniques should be used to distinguish among segments of the hatchery population.
- Fish produced should be qualitatively similar to natural fish in size.
- Fish produced should be qualitatively similar to natural fish in behavior.

**Comments:**

nc

nc

nc

nc

double check marine short-term and long-term

all hatchery spch (WS and RB) are marked.

**Data source:**

nds  
nds  
nds  
nds  
nds  
see ODFW

Section 2: Program Effects on ESA-Listed Salmonid Populations

	<b>2.1 List all ESA permits or authorizations in hand for the hatchery program.</b>
<a href="#">150</a>	<p>The program has the following permits or authorizations: 401 certification</p> <p><b>Comments:</b></p> <p>Section 7 in progress</p> <p>text from HGMP 10 October 2002:</p> <p>NMFS Biological Opinion on Artificial Propagation in the Columbia River Basin 1999.</p> <p><b>Data source:</b></p> <p>nds</p>
<a href="#">145</a>	<b>2.2.1 Descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.</b> <p>Listed populations that may be incidentally affected by the spring Chinook salmon program include species utilizing habitat in the Warm Springs River, Shitike Creek, Deschutes River, and the Columbia River downstream of the confluence of the Deschutes River. Of particular concern to the Warm Springs NFH is the population of threatened summer steelhead (<i>Oncorhynchus mykiss</i>). Summer steelhead in the Warm Springs River and the Deschutes River subbasin, a component of the Middle Columbia River Evolutionary Significant Unit, were listed as a threatened species by the National Marine Fisheries Service in 1999. The life history characteristics of Warm Springs River summer steelhead are typical of Middle Columbia steelhead. Adult steelhead migrate from the ocean, up the Columbia River, and begin entering the Deschutes River in June. Most adults destined to spawn in the Warm Springs River overwinter in the mainstem of the Deschutes River and begin their spawning migration by entering the Warm Springs River in mid-February. The peak migration past Warm Springs NFH typically occurs in mid-April and is completed by late May (CRiS Database 7/11/02.). Steelhead may begin spawning soon after they enter the Warm Springs River, with spawning taking place from late February to early June. Spawning in the Warm Springs River subbasin primarily occurs in the upper sections of the river above Warm Springs NFH, and in tributaries such as Mill Creek, Beaver Creek, and Badger Creek (Cates 1992).</p> <p>Depending on the time of spawning and water temperatures, fry emerge from the gravel in spring or early summer. Juvenile steelhead in the Warm Springs River exhibit two life history strategies. Some juvenile steelhead rear in the Warm Springs River for one to three years until they begin the smolting process and migrate to the ocean. Another component of the juvenile population migrates out of the Warm Springs River as presmolts and continues to rear in the Deschutes River for one to three years before smolting and migrating to the ocean. The outmigration of juvenile steelhead from the Warm Springs River occurs during the higher spring flows, typically from March through June. A smaller outmigration of primarily presmolt juvenile steelhead occurs in the fall (Cates 1992).</p>

Shitike Creek, a tributary of the Deschutes River located on the Warm Springs Reservation, also supports a population of summer steelhead. The life history characteristics of steelhead in Shitike Creek are thought to be similar to those in the Warm Springs River, with adult steelhead entering Shitike Creek in the early spring and spawning taking place shortly after entrance into the creek. The primary spawning area in Shitike Creek is thought to be below Peters Pasture (RM 25). Juvenile steelhead rear in the lower sections of the creek or emigrate to the Deschutes River for rearing. The CTWSRO operates an adult weir and a rotary screw trap near the mouth of Shitike Creek in order to gather life history information on steelhead, bull trout, and spring Chinook salmon. Steelhead redd surveys are also conducted by CTWSRO staff in late April or early May.

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nya  
Listed stocks may be directly affected by nya.

The following ESA listed natural salmonid populations occur in the subbasin where the program fish are released:

ESA listed stock	Viability		Habitat
Steelhead-Integrated	M		M
Bull Trout- Natural	M		M
H, M and L refer to high, medium and low ratings, low implying critical and high healthy.			

Comments:

nc  
nc  
nc  
nc

Data source:

Draft HGMP  
nds  
nds  
nc

2.2.2

Status of ESA-listed salmonid population(s) affected by the program.

nya

Most recent available spawning escapement estimates are shown in the table below:

Steelhead-Integrated

Return Year	Total Catch (all ages)	Natural Escapement		Hatchery Spawning	
		NoRs	HoRs	NoRs	HoRs
Goal	nya	nya	nya	nya	nya
1990	2773	3700	nya	0	424
1991	2651	4900	nya	0	312
1992	2183	900	nya	0	290

1993	1865	1500	nya	0	322
1994	1604	500	nya	0	199
1995	2643	1662	nya	0	325
1996	4466	3458	nya	0	279
1997	4269	1820	nya	0	273
1998	1363	3800	nya	0	326
1999	3095	4790	nya	0	274
2000	2667	8985	nya	0	227
2001	5837	8749	nya	0	268

Bull Trout- Natural

Return Year	Total Catch (all ages)	Natural Escapement		Hatchery Spawning	
		NoRs	HoRs	NoRs	HoRs
Goal	nya	nya	nya	nya	nya
1990	nya	nya	nya	nya	nya
1991	nya	nya	nya	nya	nya
1992	nya	nya	nya	nya	nya
1993	nya	nya	nya	nya	nya
1994	nya	nya	nya	nya	nya
1995	nya	nya	nya	nya	nya
1996	nya	nya	nya	nya	nya
1997	nya	nya	nya	nya	nya
1998	nya	nya	nya	nya	nya
1999	nya	nya	nya	nya	nya
2000	nya	nya	nya	nya	nya
2001	nya	nya	nya	nya	nya

Comments:

nc  
nc  
nc

Data source:

nds

2.2.3

Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take.

Warm Springs Spring Chinook- Integrated

ESU/Population

Stehad

Activity

nya

Location of hatchery activity

nya

Dates of activity

nya

Hatchery Program Operator

nya

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Annual Take of Listed Fish by life Stage (number of fish)

Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harrass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	nya	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., brookstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	nya	nya
Unintentional lethal take (f)	nya	nya	nya	nya
Other take (specify) (h)	nya	nya	nya	nya

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Fall Chinook - Natural

ESU/Population

nya

Activity

nya

Location of hatchery activity

nya

Dates of activity

nya

Hatchery Program Operator

nya

152



## Annual Take of Listed Fish by life Stage (number of fish)

	Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
153	Observe or harrass (a) <i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>
	Collect for transport (b) <i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>
	Capture, handle, and release (c) <i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>
	Capture, handle, tag/mark/tissue sample, and release (d) <i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>
	Removal (e.g., brookstock (e) <i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>
	Intentional lethal take (f) <i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>
	Unintentional lethal take (f) <i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>
	Other take (specify) (h) <i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>

*Steelhead-Integrated*

152	<b>ESU/Population</b>	Mid-Columbia ESU / Deschutes River
	<b>Activity</b>	Hatchery Monitoring
	<b>Location of hatchery activity</b>	Warm Springs River, Shitike Creek,
	<b>Dates of activity</b>	Annually (January1 - December 31)
	<b>Hatchery Program Operator</b>	USFWS Hatchery Operation + Montoring, CRWSRO Monitoring

## Annual Take of Listed Fish by life Stage (number of fish)

	Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
153	Observe or harrass (a) <i>nya</i>	2000	1635	25	
	Collect for transport (b) <i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>
	Capture, handle, and release (c) <i>nya</i>	16000	710	<i>nya</i>	
	Capture, handle, tag/mark/tissue sample, and release (d) <i>nya</i>	3020	25	<i>nya</i>	
	Removal (e.g., brookstock (e) <i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>

<b>Intentional lethal take (f)</b>	<i>nya</i>	2	2	<i>nya</i>
<b>Unintentional lethal take (f)</b>	<i>nya</i>	100	5	<i>nya</i>
<b>Other take (specify) (h)</b>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>

**Red Band Rainbow Trout- Natural****ESU/Population** *nya***Activity** *nya***Location of hatchery activity** *nya***Dates of activity** *nya***Hatchery Program Operator** *nya***Annual Take of Listed Fish by life Stage (number of fish)**

Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
<b>Observe or harrass (a)</b>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>
<b>Collect for transport (b)</b>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>
<b>Capture, handle, and release (c)</b>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>
<b>Capture, handle, tag/mark/tissue sample, and release (d)</b>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>
<b>Removal (e.g., brookstock (e)</b>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>
<b>Intentional lethal take (f)</b>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>
<b>Unintentional lethal take (f)</b>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>
<b>Other take (specify) (h)</b>	<i>nya</i>	<i>nya</i>	<i>nya</i>	<i>nya</i>

**Bull Trout- Natural****ESU/Population** *nya***Activity** *nya***Location of hatchery activity** *nya***Dates of activity** *nya***Hatchery Program Operator** *nya*

Annual Take of Listed Fish by life Stage (number of fish)					
Type of Take		Egg/Fry	Juvenile/Smolt	Adult	Carcass
153	Observe or harrass (a)	nya	nya	nya	nya
	Collect for transport (b)	nya	nya	nya	nya
	Capture, handle, and release (c)	nya	nya	nya	nya
	Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
	Removal (e.g., brookstock (e)	nya	nya	nya	nya
	Intentional lethal take (f)	nya	nya	nya	nya
	Unintentional lethal take (f)	nya	nya	nya	nya
	Other take (specify) (h)	nya	nya	nya	nya

Round Butte Spring Chinook - Hatchery

152	ESU/Population	nya
	Activity	nya
	Location of hatchery activity	nya
	Dates of activity	nya
	Hatchery Program Operator	nya

Annual Take of Listed Fish by life Stage (number of fish)					
Type of Take		Egg/Fry	Juvenile/Smolt	Adult	Carcass
153	Observe or harrass (a)	nya	nya	nya	nya
	Collect for transport (b)	nya	nya	nya	nya
	Capture, handle, and release (c)	nya	nya	nya	nya
	Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
	Removal (e.g., brookstock (e)	nya	nya	nya	nya

<b>Intentional lethal take (f)</b>	nya	nya	nya	nya
<b>Unintentional lethal take (f)</b>	nya	nya	nya	nya
<b>Other take (specify) (h)</b>	nya	nya	nya	nya

**Red Band Rainbow Trout (Oaks Springs)-Hatchery****ESU/Population** nya**Activity** nya**Location of hatchery activity** nya**Dates of activity** nya**Hatchery Program Operator** nya**Annual Take of Listed Fish by life Stage (number of fish)**

Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
<b>Observe or harrass (a)</b>	nya	nya	nya	nya
<b>Collect for transport (b)</b>	nya	nya	nya	nya
<b>Capture, handle, and release (c)</b>	nya	nya	nya	nya
<b>Capture, handle, tag/mark/tissue sample, and release (d)</b>	nya	nya	nya	nya
<b>Removal (e.g., brookstock (e)</b>	nya	nya	nya	nya
<b>Intentional lethal take (f)</b>	nya	nya	nya	nya
<b>Unintentional lethal take (f)</b>	nya	nya	nya	nya
<b>Other take (specify) (h)</b>	nya	nya	nya	nya

**Kokanee- Hatchery****ESU/Population** nya**Activity** nya**Location of hatchery activity** nya**Dates of activity** nya**Hatchery Program Operator** nya

Annual Take of Listed Fish by life Stage (number of fish)					
Type of Take		Egg/Fry	Juvenile/Smolt	Adult	Carcass
153	Observe or harrass (a)	nya	nya	nya	nya
	Collect for transport (b)	nya	nya	nya	nya
	Capture, handle, and release (c)	nya	nya	nya	nya
	Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
	Removal (e.g., brookstock (e)	nya	nya	nya	nya
	Intentional lethal take (f)	nya	nya	nya	nya
	Unintentional lethal take (f)	nya	nya	nya	nya
	Other take (specify) (h)	nya	nya	nya	nya

Brown Trout

152	ESU/Population	nya
	Activity	nya
	Location of hatchery activity	nya
	Dates of activity	nya
	Hatchery Program Operator	nya

Annual Take of Listed Fish by life Stage (number of fish)					
Type of Take		Egg/Fry	Juvenile/Smolt	Adult	Carcass
153	Observe or harrass (a)	nya	nya	nya	nya
	Collect for transport (b)	nya	nya	nya	nya
	Capture, handle, and release (c)	nya	nya	nya	nya
	Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
	Removal (e.g., brookstock (e)	nya	nya	nya	nya

<b>Intentional lethal take (f)</b>	nya	nya	nya	nya
<b>Unintentional lethal take (f)</b>	nya	nya	nya	nya
<b>Other take (specify) (h)</b>	nya	nya	nya	nya

*Kokanee-Lake Billy Chinook***ESU/Population** nya**Activity** nya**Location of hatchery activity** nya**Dates of activity** nya**Hatchery Program Operator** nya**Annual Take of Listed Fish by life Stage (number of fish)**

Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
<b>Observe or harrass (a)</b>	nya	nya	nya	nya
<b>Collect for transport (b)</b>	nya	nya	nya	nya
<b>Capture, handle, and release (c)</b>	nya	nya	nya	nya
<b>Capture, handle, tag/mark/tissue sample, and release (d)</b>	nya	nya	nya	nya
<b>Removal (e.g., brookstock (e)</b>	nya	nya	nya	nya
<b>Intentional lethal take (f)</b>	nya	nya	nya	nya
<b>Unintentional lethal take (f)</b>	nya	nya	nya	nya
<b>Other take (specify) (h)</b>	nya	nya	nya	nya

*Brook Trout***ESU/Population** nya**Activity** nya**Location of hatchery activity** nya**Dates of activity** nya**Hatchery Program Operator** nya

Annual Take of Listed Fish by life Stage (number of fish)					
Type of Take		Egg/Fry	Juvenile/Smolt	Adult	Carcass
153	Observe or harrass (a)	nya	nya	nya	nya
	Collect for transport (b)	nya	nya	nya	nya
	Capture, handle, and release (c)	nya	nya	nya	nya
	Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
	Removal (e.g., brookstock (e)	nya	nya	nya	nya
	Intentional lethal take (f)	nya	nya	nya	nya
	Unintentional lethal take (f)	nya	nya	nya	nya
	Other take (specify) (h)	nya	nya	nya	nya
Cranebows- Integrated					
152	ESU/Population	nya			
	Activity	nya			
	Location of hatchery activity	nya			
	Dates of activity	nya			
	Hatchery Program Operator	nya			

Annual Take of Listed Fish by life Stage (number of fish)					
Type of Take		Egg/Fry	Juvenile/Smolt	Adult	Carcass
153	Observe or harrass (a)	nya	nya	nya	nya
	Collect for transport (b)	nya	nya	nya	nya
	Capture, handle, and release (c)	nya	nya	nya	nya
	Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
	Removal (e.g., brookstock (e)	nya	nya	nya	nya

152	<b>Intentional lethal take (f)</b>	nya	nya	nya	nya
	<b>Unintentional lethal take (f)</b>	nya	nya	nya	nya
	<b>Other take (specify) (h)</b>	nya	nya	nya	nya
	<b>Rainbow Trout Stock 53</b>				
	<b>ESU/Population</b>	nya			
	<b>Activity</b>	nya			
	<b>Location of hatchery activity</b>	nya			
	<b>Dates of activity</b>	nya			
	<b>Hatchery Program Operator</b>	nya			

Annual Take of Listed Fish by life Stage (number of fish)					
Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass	
<b>Observe or harrass (a)</b>	nya	nya	nya	nya	
<b>Collect for transport (b)</b>	nya	nya	nya	nya	
<b>Capture, handle, and release (c)</b>	nya	nya	nya	nya	
<b>Capture, handle, tag/mark/tissue sample, and release (d)</b>	nya	nya	nya	nya	
<b>Removal (e.g., brookstock (e)</b>	nya	nya	nya	nya	
<b>Intentional lethal take (f)</b>	nya	nya	nya	nya	
<b>Unintentional lethal take (f)</b>	nya	nya	nya	nya	
<b>Other take (specify) (h)</b>	nya	nya	nya	nya	

Comments:

text from HGMP 10 October 2002:

Incidental take of summer steelhead could occur through activities associated with the Warm Springs NFH adult collection facility. A fish barrier dam, adjacent to the hatchery, blocks upstream passage of all fish and directs them into a fish ladder located at the hatchery. Upon entering the fish ladder, fish are either directed into holding ponds or passed upstream above the barrier dam. An automated fish passage system is used during the spring Chinook salmon migration period, generally from May through the end of September. The automated passage system is designed to minimize handling of wild fish by passively separating returning hatchery spring Chinook salmon, identified



by the presence of coded-wire tags, from wild fish. The passage system uses a 15-foot long denil steep pass fishway with a coded-wire tag tube detector and gate. As fish swim through the fishway and tube detector, coded-wire tagged fish are detected and a gate opens that shunts them into a holding pond. Non coded-wire tagged fish do not trigger the gate and are able to continue migrating up through the fish ladder and upstream of the barrier dam. A video system records non-coded wire tagged fish as they pass upstream of the hatchery. The video system allows hatchery personnel to monitor the number, species, and origin of fish passing upstream. During operation of the automated passage system wild fish are not handled by hatchery personnel, thereby reducing the potential take of listed species. Migration delays as fish find their way into the fish ladder and through the passage system, rejection of the fish ladder resulting in displaced spawning, and injuries suffered as adults try to jump the barrier dam are potential incidental takes associated with the barrier dam. The actual level of incidental take associated with the barrier dam is unknown at this time. Based on observations by hatchery personnel of fish movements through the barrier dam and passage system, the level of take is assumed to be low (Mike Paiya, USFWS Warm Springs NFH, pers. comm.).

The automated passage system is only used during the spring Chinook salmon migration period, generally from April 15 to September 30. The proper functioning of the passage system relies on 100% coded-wire tagging of hatchery fish, with all non coded-wire tagged fish passed upstream. All spring Chinook salmon juveniles released from Warm Springs NFH are coded-wire tagged (the tag retention goal is 95%) but stray hatchery fish from hatcheries outside the subbasin may not be coded-wire tagged. The Warm Springs River, and the Deschutes River subbasin in general, has a high incidence of stray hatchery steelhead (Olson and Pastor 1998). In order to preserve the genetic integrity of wild steelhead in the Warm Springs River, it is the policy of Warm Springs NFH to pass only wild (unmarked) steelhead above the barrier dam. In order to accomplish this goal, the automated fish passage system is not used until the steelhead migration has ended, usually sometime in late April. During the steelhead migration period fish find their way into the fish ladder and into a holding pond. Hatchery personnel then hand sort the fish. Fish are sedated using CO<sub>2</sub>, sorted, measured, and then either passed upstream or collected for the hatchery. All wild summer steelhead, bull trout, and other indigenous fish species are passed upstream. Stray hatchery steelhead, identified as having missing or deformed fins, are held in holding ponds, killed, and distributed to the CTWSRO.

Incidental take of listed species may occur during the manual sorting of fish in the fish ladder at Warm Springs NFH. Potential take could occur as a result of delay in migration timing, stress associated with handling, or misidentification of wild and hatchery steelhead. Hatchery personnel attempt to minimize handling stress on fish by following the appropriate fish handling guidelines. Direct take on listed species as a result of the fish barrier dam, fish ladder, and hatchery sorting procedures has been minimal. Three unmarked adult steelhead were accidentally killed in 1998. No other mortality of unmarked adult steelhead at the hatchery has been recorded since 1995 (CRIS Database 3/18/02).

Monitoring activities associated with the Warm Springs spring Chinook program also have the potential for incidental take of listed steelhead and bull trout. A rotary screw trap, located at approximately Rkm 5 of the Warm Springs River, is operated by the CTWSRO in order to gather outmigration timing and population estimates for juvenile spring Chinook salmon. The trap is typically operated from mid-March through mid-November. Juvenile spring Chinook salmon collected at the trap are anesthetized with MS-222, measured, weighed, and a subsample is marked and released upstream for mark-recapture population estimates. Some juvenile spring Chinook salmon may be implanted with radio-tags in order to monitor their migration behavior in the Deschutes River (See Section 12). Listed juvenile steelhead and bull trout are also collected at the trap. Juvenile steelhead and juvenile resident trout are visually indistinguishable and are summarized together for monitoring purposes. Juvenile steelhead will be handled, measured, and marked using the same procedures as for spring Chinook salmon. For an estimate of the number of steelhead trapped see Take Table 1. The probability of capture for juvenile bull trout in the trap is low, with fewer than ten bull trout trapped per year (Bob Spateholts, CTWSRO Warm Springs, pers. comm.). If juvenile bull trout are collected at the trap they will be weighed, measured, marked, and released upstream.

Incidental take of juvenile summer steelhead may occur through stress associated with the handling and marking procedures. Procedures associated with the juvenile trap are designed to minimize stress and potential take. The traps are checked regularly in order to minimize the amount of time fish are held at the trap. The amount of time fish are under anesthetic is carefully monitored and fish are allowed sufficient time to recover before being released back into the river. The potential for direct take of listed species at the traps as a result of trap malfunction or predator intrusion is considered to be low. The CTWSRO have observed mink predation on fish caught in the screw trap (Bob Spateholts, CTWSRO Warm Springs, pers. comm.). If recurring predators become a problem, live traps may be set to relocate the predators away from the trap site. During periods of high flows debris may clog the rotary screw mechanism or live box, possibly resulting in descaling or wounding of fish in the trap. Daily monitoring of the trap is expected to minimize take associated with trap malfunction or predator intrusion. If high flows are anticipated, the trap is raised in order to reduce the likelihood of trap malfunction. The traps are also deactivated when water temperatures exceed 20 degrees Celsius or if there are visible signs of stress in fish in the live box.

Estimated take levels for listed steelhead in the Warm Springs River are summarized in Take Table 1.

The USFWS expects to conduct research and monitoring activities at the hatchery and in the stream environment that will focus on the ecological interactions of hatchery and wild fish in the Warm Springs River, Shitike Creek, and Deschutes River. The research program is intended to gather information that will help managers evaluate hatchery practices and reduce impacts of the hatchery program on wild fish populations. Proposed research activities associated with Warm Spring NFH are discussed in detail in Section 12. Sampling of spring Chinook salmon will occur through the normal hatchery and monitoring activities on the Warm Springs River. Incidental take associated with the research program is expected to be minimal. Up to 100 juvenile spring Chinook salmon will be implanted with radio-tags at the rotary screw trap on the Warm Springs River. Other research activities on the Warm Springs River include expanded redd surveys and tissue sampling for genetic pedigree analysis of hatchery spring Chinook salmon at the Warm Springs NFH.

The USFWS and the CTWSRO also anticipate conducting monitoring and research activities on Shitike Creek. Shitike Creek is small tributary of the Deschutes River that is located on the Warm Springs Reservation. Since 2000, the USFWS and the CTWSRO have outplanted Warm Springs NFH adult spring Chinook salmon into Shitike Creek. The objectives of the monitoring and research program are as follows:

- 1) Evaluate the contribution of outplanted spring Chinook salmon to the natural production in Shitike Creek.
- 2) Investigate the potential ecological interactions of spring Chinook, bull trout, and summer steelhead in Shitike Creek.

As part of the monitoring program, adult spring Chinook salmon will be sampled at a temporary weir located near the mouth of Shitike Creek. The temporary weir is operated by the CTWSRO as part of a bull trout monitoring program funded by the Bonneville Power Administration. The weir is typically installed in late April or early May, after the main upstream migration of adult summer steelhead. Adult fish migrating upstream are trapped at the weir and sampled by CTWSRO personnel. Sampling includes taking length measurements and scale samples. As part of the spring Chinook salmon program, tissue and scale samples will be collected from all upstream migrating spring Chinook salmon. Incidental take of steelhead may occur at the weir as a result of handling stress or delayed migration, although the weir is typically installed after the steelhead migration (Take Table 2).

Juvenile sampling of downstream migrating fish occurs at a rotary screw trap located near the mouth of Shitike Creek in the town of Warm Springs. The screw trap is operated when flows are sufficient, typically from March through June and from October through November. The CTWSRO operates the trap as part of the bull trout study and also to gather juvenile population estimates for steelhead and spring Chinook. Procedures for operating the Shitike Creek screw trap are the same as for the Warm Springs River screw trap. The outplanting monitoring program will collect tissue samples (fin clips) from approximately 1000 juvenile spring Chinook salmon captured at the trap. Passive Integrated Transponder (PIT) tags may also be applied to juvenile Chinook salmon. No additional take of listed species is anticipated as a result of the spring Chinook salmon sampling. The USFWS and the CTWSRO will also conduct snorkel surveys and juvenile sampling in Shitike Creek during July and August. Snorkel surveys will collect observational data on microhabitat preferences, species associations, and species interactions for juvenile salmonids. Tissue samples from age 0 spring Chinook salmon will be collected during the summer. It is anticipated that age 0 spring Chinook salmon will be collected using either minnow trapping or seining techniques. Minnow traps will be baited with tuna or cat food and placed in selected pools for 45 minutes. The pools will be block-netted at the upstream and downstream ends in order to prevent migration into or emigration out of the pool during sampling. After 45 minutes the traps will be removed and the fish in the traps will be sampled. The fish will then be returned to the stream and the block nets will be removed. If seining is used, snorkelers will enter the stream and herd? spring Chinook towards a seine, where they will be collected and sampled. During sampling the fish will be held in containers of freshwater, anesthetized with MS-222, counted, and placed into a recovery bucket. Once the fish have fully recovered they will be released back into the stream. Incidental take may occur as a result of harassment or stress associated the minnow traps or with snorkelers herding? fish towards a seine. In order to minimize potential take, minnow trapping or seining will not take place in locations where there is a high abundance of listed species.

nc  
nc

#### Data source:

nds  
Draft HGMP  
Draft HGMP

Section 3: Relationship of Program to Other Management Objectives

3.1 Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. Hood Canal Summer Chum Conservation Initiative) or other regionally accepted policies (e.g. the NPPC Annual Production Review Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

155  
nya  
Comments:  
  
nc  
Data source:  
  
nds

3.2 List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

	Document Title	Type
	Federal Statute 184	O
156	IHOT Standards and Policies	O
	Intra-Service Section 7 Consultation for bull trout	O
	Memorandum of Understanding between the USFWS and the CTWSRO, March 10, 1998	MOU
	Comments:	
	nc	
	Data source:	
	Draft HGMP	

3.3 Relationship to harvest objectives.

157  
Artificial production at Warm Springs NFH is integrated with harvest management in order to provide a sustainable harvest of hatchery spring Chinook salmon while minimizing risks to wild fish populations in the Warm Springs and Deschutes Rivers. All juvenile hatchery spring Chinook salmon released from Warm Springs NFH are externally marked for visual identification. The CTWSRO and the Oregon Department of Fish and Wildlife (ODFW) co-manage harvest in the Deschutes River Subbasin, while harvest in the Columbia River is managed by the parties to U.S. v. Oregon. Harvest management decisions are consistent with the ODFW Lower Deschutes River Fish Subbasin Management Plan (1997). Harvest for Warm Springs River spring Chinook salmon occurs primarily in the Deschutes River and lower Warm Springs River. Wild fish abundance drives fishery management decisions made by the CTWSRO and the ODFW.

Comments:

nc

Data source:

<b>3.4 Relationship to habitat protection and recovery strategies.</b>	
158	<p>Natural production in the Warm Springs River and Deschutes River is limited by the following: water quantity, water quality, consumptive water use, instream water rights, water diversion screening, sedimentation, stream substrate, cover, and barriers to fish passage (ODFW 1997). The CTWSRO are responsible for habitat protection and recovery strategies on the Warm Springs Reservation. Habitat conditions in the Warm Springs River and Shitike Creek are considered to be fair to good. The CTWSRO have implemented various habitat restoration programs including riparian fencing, water diversion modifications, and placement of instream structures.</p> <p><b>Comments:</b></p> <p>nc</p> <p><b>Data source:</b></p> <p>nds</p>

<b>3.5 Ecological interactions.</b>	
159	<p>The following species co-occur to a significant degree with the program fish in either freshwater or early marine life stages.</p> <ul style="list-style-type: none"><li>● Steelhead</li><li>● Pink</li><li>● Chum</li><li>● Sockeye</li><li>● Coho</li><li>● Chinook</li></ul> <p><b>Comments:</b></p> <p>nc</p> <p><b>Data source:</b></p> <p>nds</p>

Section 4. Water Source

<b>4.1 Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile and natural limitations to production attributable to the water source.</b>	
12	<p>The following statements describe the adult holding water source:</p> <ul style="list-style-type: none"><li>● The water source is pumped.</li><li>● The water source is specific-pathogen free.</li><li>● The water source is accessible to anadromous fish.</li><li>● Water is from the natal stream for the cultured stock.</li><li>● The water used meets or exceeds the recommended Integrated Hatchery Operations Team (IHOT) water quality guidelines for temperature.</li><li>● The water used meets or exceeds the recommended Integrated Hatchery Operations Team (IHOT) water quality guidelines for ammonia, carbon dioxide, chlorine, pH, copper, dissolved oxygen, hydrogen sulfide, dissolved nitrogen, iron, and zinc</li><li>● The water supply is protected by flow alarms at the intake(s).</li></ul>

- The water supply is protected by flow alarms at the head box.
- The water supply is protected by back-up power generation.
- Naturally produced fish do not have access to intake screens.
- Hatchery intake screening complies with Integrated Hatchery Operations Team (IHOT) and National Marine Fisheries Service facility guidelines.

**The following statements describe the incubation water source:**

- The water source is gravity flow.
- The water source is pathogen-free.
- The water source is fish free.
- Water is available from multiple sources.
- The water used provides natural water temperature profiles that results in hatching/emergence timing similar to that of the naturally produced stock.
- Incubation water can be heated or chilled to approximate natural water temperature profiles.
- The water used meets or exceeds the recommended Integrated Hatchery Operations Team (IHOT) water quality guidelines for temperature.
- The water used meets or exceeds the recommended Integrated Hatchery Operations Team (IHOT) water quality guidelines for ammonia, carbon dioxide, chlorine, pH, copper, dissolved oxygen, hydrogen sulfide, dissolved nitrogen, iron, and zinc.
- The water supply is protected by flow alarms at the intake(s).
- The water supply is protected by flow and/or pond level alarms at the holding pond(s).
- The water supply is protected by back-up power generation
- Naturally produced fish do not have access to intake screens.

**The following statements describe the rearing water source:**

- The water source is pumped.
- The water source is specific-pathogen free.
- The water source is accessible to anadromous fish.
- Water is from the natal stream for the cultured stock.
- The hatchery operates to allow all migrating species of all ages to by-pass or pass through hatchery related structures.
- Adequate flows are maintained to provide unimpeded passage of adults and juveniles in the by-pass reach created by hatchery water withdrawals.
- The water used meets or exceeds the recommended Integrated Hatchery Operations Team (IHOT) water quality guidelines for ammonia, carbon dioxide, chlorine, pH, copper, dissolved oxygen, hydrogen sulfide, dissolved nitrogen, iron, and zinc.
- The water supply is protected by flow alarms at the intake(s).
- The water supply is protected by flow alarms at the head box.
- The water supply is protected by back-up power generation.
- Naturally produced fish do not have access to intake screens.
- Hatchery intake screening complies with Integrated Hatchery Operations Team (IHOT) and National Marine Fisheries Service facility guidelines.

**Comments:**

Intake screening and temperature in compliance with IHOT guidelines per Columbia Plateau HGMP workshop, April 2004.

text from HGMP 10 October 2002:

The water source for the hatchery is the Warm Springs River. All water rights on the Warm Springs River are the property of the CTWSRO. The intake structure and pumps are located at the hatchery site just upstream of the barrier dam. Prior to being pumped, water is passed through a trash rack and traveling screen. In front of the traveling screen is a fish bypass which deposits small fish below the barrier dam. The screens on the intake are 3/16th inch mesh.

Intake screening in compliance with IHOT guidelines per Columbia Plateau HGMP workshop, April 2004.

Intake screening in compliance with IHOT guidelines per Columbia Plateau HGMP workshop, April 2004.

**Data source:**

13

14

4.2

Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

15

The facility operates within the limitations established in its National Pollution Discharge Elimination System (NPDES) permit , The production from this facility falls below the minimum production requirement for an NPDES permit, but the facility operates in compliance with state or federal regulations for discharge and The facility does not have a discharge permit.

Comments:

text from HGMP 10 October 2002:

A small number of wild juvenile steelhead or resident rainbow trout, lamprey, and suckers has been observed in the rearing ponds at the hatchery. This indicates that juvenile fish from the Warm Springs River are making it through the intake and into the hatchery. The Integrated Hatchery Operations Team noted that the current 3/16th inch mesh does not meet the 1/10th inch standard for screening facilities (IHOT 1996). The Warm Springs NFH Implementation Plan (CTWSRO and USFWS 2002) identifies the need to replace the water intake structure to meet NMFS Hatchery Biological Opinion criteria.

Data source:

Section 5. Facilities

5.1

Broodstock collection facilities (or methods).

16

Brookstock for this program is collected:

- by volitional return to adult capture pond.
- from wild by weir. \*\* NO STATEMENT PROVIDED FOR THIS CHOICE \*\*

188

Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
2	Oval Ponds	7800	50	26	6	nya
nya	nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya

Comments:

text from HGMP 10 October 2002:

All fish passing upstream are blocked by a barrier dam and are directed to a fish ladder at Warm Springs NFH. All fish must use the fish ladder in order to pass upstream of the hatchery. During the spring Chinook salmon migration period (April 16- September 30), an automated fish passage system is used to pass all wild (unmarked) fish upstream of the barrier dam (see Section 2.2.3 for more details). Fish that are not passed upstream are directed into a catch pond. The catch pond measures 28ft x 8ft, with a water depth of 3ft. Fish are then moved from the catch ponds into holding ponds at the hatchery. Fish are held in the holding ponds until spawning.

nc

Data source:

nds

5.2 Fish transportation equipment (description of pen, tank, truck, or container used).

99

IHOT guidelines for transportation are followed.

187

Equipment Type	Capacity (gallons)	Supplemental Oxygen (y/n)	Temperature Control (y/n)	Normal Transit Time (minutes)	Chemical (s) Used	Dosage (ppm)
nya	nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya

Comments:

USFWS Guidelines

text from 10 October 2002:

Broodstock fish are held and spawned onsite at the hatchery. Fish designated for outplanting are loaded and sorted during spawning at the hatchery and are trucked to Shitike Creek in a 300 gallon tank truck by the CTWSRO.  
text from HGMP 10 October 2002:

Approximately 200 hatchery adult spring Chinook salmon are outplanted into Shitike Creek during late August and early September. Staff from the CTWSRO use a tank truck to transport fish from the adult holding ponds to five release sites along Shitike Creek.

Egg Transportation

There is no off-station transport of spring Chinook salmon eggs at the present time.

Fingerling Transportation

There is no off-station transport of spring Chinook salmon fingerlings at the present time.

Smolt Transportation

There is no off-station transport of spring Chinook salmon smolts occurring at the present time.

There has been transport of eggs, fingerlings, and smolts to other sites for research purposes by USGS in the past. Emergency conditions at the hatchery may result in the temporary transfer of eggs or juveniles to other hatcheries.

nds  
nds

5.3

Broodstock holding and spawning facilities.

Spawning for this program takes place:

● in a covered facility. \*\* NO STATEMENT PROVIDED FOR THIS CHOICE \*\*\*\* NO STATEMENT PROVIDED FOR THIS CHOICE \*\*

Integrated Hatchery Operations Team (IHOT) adult holding guidelines followed for adult holding , density and predator control measures to provide the necessary security for the broodstock.

	Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
188	2	Oval Ponds	7800	50	26	6	nya
	nya	nya	nya	nya	nya	nya	nya
	nya	nya	nya	nya	nya	nya	nya
	nya	nya	nya	nya	nya	nya	nya

Comments:

text from HGMP 10 October 2002:

All fish passing upstream are blocked by a barrier dam and are directed to a fish ladder at Warm Springs NFH. All fish must use the fish ladder in order to pass upstream of the hatchery. During the spring Chinook salmon migration period (April 16- September 30), an automated fish passage system is used to pass all wild (unmarked) fish upstream of the barrier dam (see Section 2.2.3 for more details). Fish that are not passed upstream are directed into a catch pond. The catch pond measures 28ft x 8ft, with a water depth of 3ft. Fish are then moved from the catch ponds into holding ponds at the hatchery. Fish are held in the holding ponds until spawning.

text from HGMP 10 October 2002:

Two oval shaped ponds, each 50ft x 26ft with approximately a 6ft water depth are used to hold broodstock until spawning. Each pond is fully enclosed at the top and sides above the water surface by nylon netting. The netting prevents fish from jumping out of the holding ponds and prevents predators from gaining entry. The ponds are plumbed to supply chilled water as summer water temperatures increase.

nc

Data source:

nds  
nds

5.4

Incubation facilities.

	Incubator Type	Units (number)	Flow (gpm)	Volume (cu.ft.)	Loading-Eyeing (eggs/unit)	Loading-Hatching (eggs/unit)
189	Heath Incubators 15 /stack	16	nya	nya	5000	nya
	nya	nya	nya	nya	nya	nya
	nya	nya	nya	nya	nya	nya
	nya	nya	nya	nya	nya	nya



Comments:

nc

Data source:

nds

5.5 Rearing facilities.

Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Maximum Flow Index	Maximum Density Index
20	Retangular Burrows ponds	2040	75	16	1.7	nya	nya	nya
20	Modified Rectangular Burrows	1020	75	8	1.7	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya	nya	nya

Comments:

text from HGMP 10 October 2002:

All Warm Springs NFH spring Chinook salmon smolts are released onsite at the hatchery. Gates are opened at the end of each raceway that allow fish to leave the hatchery via a pipe that enters the Warm Springs River, just downstream of the adult barrier dam.

Data source:

nds

5.6 Acclimation/release facilities.

Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Maximum Flow Index	Maximum Density Index
20	Retangular Burrows ponds	2040	75	16	1.7	nya	nya	nya
20	Modified Rectangular Burrows	1020	75	8	1.7	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya	nya	nya

text from HGMP 10 October 2002:

All Warm Springs NFH spring Chinook salmon smolts are released onsite at the hatchery. Gates are opened at the end of each raceway that allow fish to leave the hatchery via a pipe that enters the Warm Springs River, just downstream of the adult barrier dam.

**Data source:**

nds

---

**5.7 Describe operational difficulties or disasters that led to significant fish mortality.**

Gas/Oil spill in upper watershed 1998-1999 for release of fish. Oxygen levels in adult ponds sags below tolerable levels - problem is being addressed.

text from HGMP 10 October 2002:

[160](#)

In March of 1999, a traffic accident on Highway 26 resulted in a spill of diesel fuel into Beaver Creek, a tributary to the Warm Springs River above Warm Springs NFH. Due to concerns about fuel entering the water supply at the hatchery, all of the brood year 1998's smolts were released early. On 4 March approximately 775,000 smolts were released from the hatchery and into the Warm Springs River, this release was approximately four to six weeks earlier than the normal release time at Warm Springs NFH. No direct mortality from the early release was observed. In addition to the early release of BY 1998 smolts, BY 1999 juveniles were transported to Round Butte Hatchery. Round Butte Hatchery is located on the Deschutes River at the base of Round Butte Dam (RM 110), and is operated by the Oregon Department of Fish and Wildlife. Round Butte Hatchery and its satellite (Pelton Ladder) are used for adult collection, egg incubation, and rearing of spring Chinook salmon and summer steelhead. Round Butte Hatchery temporarily held the BY 1999 juveniles until the water supply at WSNFH was tested and found to be safe.

**Comments:**

nc

**Data source:**

nds

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**5.8 Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.**

[70](#)

Fish are reared in multiple facilities or with redundant systems to reduce the risk of catastrophic loss.

[78](#)

The facility is sited so as to minimize the risk of catastrophic fish loss from flooding.

[79](#)

Staff is notified of emergency situations at the facility.

[80](#)

The facility is continuously staffed to assure the security of fish stocks on-site.

**Comments:**

text from HGMP 10 October 2002:

Warm Springs NFH is equipped with backup generators and pumps that provide power in case of power failures. An automated alarm

system alerts on-call staff members of potential problems at the hatchery during non-work hours. The hatchery also has a chemical spill kit and floating booms to contain accidental spills. In extreme situations, fish at WSNFH can be transported to Round Butte hatchery for temporary holding.

The LCRFHC manages fish health and disease prevention in accordance with the USFWS Fish Health and IHOT policies and with protocols of ODFW. Any health problems are managed promptly by fish health personnel to limit mortality and reduce disease transmission.

nc

On-site housing  
Round Butte Hatchery rear the same stock

Data source:

nds  
nds  
nds  
nds

Section 6. Broodstock Origin and Identity

6.1 Source.	
17	<p>The broodstock chosen represents natural populations native or adapted to the watersheds in which hatchery fish will be released.</p> <p><b>Comments:</b></p> <p>D.Olson USFWS 04/23/03</p> <p>text from HGMP 10 October 2002:</p> <p>-Wild Warm Springs River spring Chinook salmon (unlisted)</p> <p>-Warm Springs NFH spring Chinook salmon</p> <p>-Round Butte Hatchery spring Chinook salmon (potential use during years of low returns to Warm Springs hatchery).</p> <p>Round Butte Hatchery spring Chinook salmon are thought to have similar life history characteristics to Warm Springs NFH spring Chinook salmon (Doug Olson, USFWS Vancouver, pers. comm). The original broodstock for Round Butte Hatchery was collected from a trap at Sherars Falls in the lower Deschutes River. It is likely that most fish collected at the falls were Warm Springs River spring Chinook salmon since the Warm Springs River is the major producer of spring Chinook salmon in the Deschutes River subbasin.</p> <p><b>Data source:</b></p>

6.2.1 History.				
Broodstock Source		Origin	Year(s) Used	
			Begin	End
Warm Springs		N	1978	Present

	Warm Springs	H	1981	Present
	nya	nya	nya	nya
	nya	nya	nya	nya
	nya	nya	nya	nya
	nya	nya	nya	nya
183	nya	nya	nya	nya
	nya	nya	nya	nya
	nya	nya	nya	nya
	nya	nya	nya	nya
	nya	nya	nya	nya
	nya	nya	nya	nya

Comments:

Use approximately 10% of wild run, recently changed to a sliding scale based on return numbers.

text from HGMP 10 October 2002:

During the first four years of broodstock collection (1978-1981), 100% of the broodstock was collected from wild Warm Springs River spring Chinook salmon. Since 1981, the majority of broodstock has been of Warm Springs NFH origin. In order to maintain wild characteristics in the hatchery program, the Warm Springs NFH Operation and Implementation Plan 2002-2006 sets a goal of having an average of 10% of the hatchery broodstock of wild origin, based on a sliding scale according to total wild returns.

Data source:

Draft HGMP, Warm Springs National Fish Hatchery Operational Plan and Implementation Plan 2002-2006.

6.2.2 Annual size.

22 The program collects sufficient numbers of donors from the natural stock to minimize founder effects.

23

25

27 The program collects sufficient broodstock to maintain an effective population size of 1000 fish per generation.

28 More than 10% of the broodstock is derived from wild fish each year.

Comments:

text from HGMP 10 October 2002:

The broodstock collection goal is 630 adult spring Chinook salmon.  
text from HGMP 10 October 2002:

All fish passing upstream are blocked by a barrier dam and are directed to a fish ladder at Warm Springs NFH. During the spring Chinook

salmon migration period (April 15- September 30), an automated fish passage system is used to pass all wild, unmarked fish upstream of the barrier (see Section 2.2.3 for more details). All coded-wire tagged fish are shunted into holding ponds. Adult fish are selected for broodstock proportionately throughout the run based on wild stock run timing. The target for broodstock collection is presented on the following page.  
Total broodstock requirement is 630 fish.

Data source:

6.2.3

Past and proposed level of natural fish in the broodstock.

Return Year	Total Catch (all ages)	Natural Escapement		Hatchery Spawning	
		NoRs	HoRs	NoRs	HoRs
Goal	nya	nya	nya	nya	nya
1990	6	1767	0	5	1390
1991	9	816	0	1	634
1992	137	973	0	89	766
1993	126	534	0	4	308
1994	15	435	0	0	62
1995	nya	235	0	2	289
1996	nya	1245	0	42	734
1997	nya	867	113	3	922
1998	nya	271	21	0	624
1999	nya	492	32	2	2676
2000	nya	2630	285	73	6300
2001	nya	2193	303	59	4163

Comments:

nc

Data source:

Draft HGMP

6.2.4

Genetic or ecological differences.

The broodstock chosen displays morphological and life history traits similar to the natural population.

Comments:

text from HGMP 10 October 2002:

Wild Warm Springs River spring Chinook salmon are adapted to the physical and biological characteristics of the Warm Springs River.

**Data source:**

<hr/>	
6.2.5	<b>Reasons for choosing.</b>
18	dna
20	
21	The broodstock chosen has the desired life history traits to meet harvest goals.
<b>Comments:</b>	
Wild stock is self-sustaining (not extirpated) D.Olson USFWS 04/23/03	
text from HGMP 10 October 2002:	
The goal of the Warm Springs NFH spring Chinook salmon program has been to integrate wild and hatchery fish in a way that maintains the biological and genetic characteristics of the fish populations in both the hatchery and stream environments. Monitoring and evaluation of the program has been ongoing since its inception in 1978. Recent evaluation studies indicate that while measurable differences have been detected in some life history characteristics, the hatchery population closely mimics those of the wild population (Olson and Spateholts 2001).	

**Data source:**

<hr/>	
6.3	<b>Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.</b>
The following procedures are in place that maintain broodstock collection within programmed levels:	
161	<ul style="list-style-type: none"><li>• The collection plan for natural origin adults is in place that prevents collection of surplus fish</li><li>• Excess adults are used for seeding available habitat in accordance with genetic guidelines</li><li>• Excess adults are culled at random and sold, buried, or donated to food banks depending on their quality</li></ul>
<b>Comments:</b>	
text from HGMP 10 October 2002:	
No adverse genetic effects to listed summer steelhead or bull trout are expected from the spring Chinook salmon hatchery broodstock selection process.	
Surplus hatchery fish are used to meet the needs of the CTWSRO. Since 2000, approximately 200 adult hatchery spring Chinook salmon have been held at the hatchery and outplanted into Shitike Creek each September. Other surplus fish are killed and distributed to the CTWSRO for tribal needs.	
<b>Data source:</b>	

nds

Section 7. Broodstock Collection

7.1 Life-history stage to be collected (adults, eggs, or juveniles).

Year	Females	Adults		Eggs	Juveniles
		Males	Jacks		
Planned	378	252	2-5%	nya	825000
1990	448	289	0	nya	nya
1991	272	197	0	nya	nya
1992	322	228	22	619102	551151
1993	161	117	2	462561	398142
1994	28	20	3	296163	420866
1995	48	43	15	540869	467427
1996	380	282	0	1047542	790422
1997	296	200	3	899119	815570
1998	355	177	44	1039781	770419
1999	393	180	39	1126032	827665
2000	308	189	8	857836	618822
2001	265	209	15	768071	nya

191

Comments:

text from HGMP 10 October 2002:

The annual broodstock collection goal is a maximum of 630 adult spring Chinook salmon. The goal is to have, on a 10 year average, 10% of the hatchery broodstock be of wild fish origin.

The Warm Springs NFH Operation and Implementation Plan 2002-2006 sets a broodstock goal of 630 spring Chinook salmon, assuming 90% pre-spawning survival and a return that is 60% female. When the number of returning males is low, the male to female spawning ratio will be 1:2. Fish that are 60 cm in length or longer are considered adults. Between two and five percent of the broodstock will be composed of jacks, i.e. fish less than 60 cm in length. The percentage reflects the estimated contribution of jacks to the wild spawning population.

Data source:

Draft HGMP

7.2 Collection or sampling design

- 16
- Broodstock collected by volitional return to adult capture pond.
  - Broodstock collected from wild by weir.
- 22
- The program collects sufficient numbers of donors from the natural stock to minimize founder effects.

[23](#)[24](#)

Representative samples of the population are collected with respect to size, age, sex ratio, run and spawn timing, and other traits important to long-term fitness.

[25](#)

The proportion of spawners brought into the hatchery follows a “spread-the-risk” strategy that attempts to improve the probability of survival for the entire population.

[27](#)

The program collects sufficient broodstock to maintain an effective population size of 1000 fish per generation.)

[28](#)

More than 10% of the broodstock is derived from wild fish each year.

**Comments:**

text from HGMP 10 October 2002:

The broodstock collection goal is 630 adult spring Chinook salmon.  
text from HGMP 10 October 2002:

All fish passing upstream are blocked by a barrier dam and are directed to a fish ladder at Warm Springs NFH. During the spring Chinook salmon migration period (April 15- September 30), an automated fish passage system is used to pass all wild, unmarked fish upstream of the barrier (see Section 2.2.3 for more details). All coded-wire tagged fish are shunted into holding ponds. Adult fish are selected for broodstock proportionately throughout the run based on wild stock run timing. The target for broodstock collection is presented on the following page.

Total broodstock requirement is 630 fish.

**Data source:**

---

**7.3 Identity.**[100](#)

Marking techniques are used to distinguish among hatchery population segments.

[101](#)

100% of the hatchery fish released are marked so that they can be distinguished from the natural population.

[102](#)

Marked fish can be identified using non-lethal means.

[106](#)

Wild fish make up 5-30% (between five and thirty percent) % of the broodstock for this program.

**Comments:**

Being implemented per Columbia Plateau HGMP workshop, April 2004.

text from HGMP 10 October 2002:

All juvenile Warm Springs NFH spring Chinook salmon are adipose-fin clipped and coded-wire tagged prior to release. The USFWS samples juvenile fish for mark quality and tag retention prior to release. The program goal is a minimum tag retention rate of 95%. The automated fish passage system sorts returning hatchery and wild fish based on the presence of coded-wire tags.



nc  
nc

Wild fish incorporated into broodstock based on sliding scale (Warm Springs Hatchery 2002-2006 operations plan). For example, if fewer than 800 wild fish return, no wild fish are used in broodstock. If between 1,300 and 1,399 wild fish return, then 10% of brood stock are wild fish. If > 2,300 wild fish return, then 20% of broodstock will be wild fish. The goal is to achieve a 10-year average of 10% wild fish in brood stock. D.Olson USFWS 04/23/03

Data source:

nds  
nds  
nds

7.4

Proposed number to be collected:

198

7.4.1 Program goal (assuming 1:1 sex ratio for adults):

nya

7.4.2 Broodstock collection levels for the last twelve years (e.g. 1990-2001), or for most recent years available.

191

		Adults			
Year	Females	Males	Jacks	Eggs	Juveniles
Planned	378	252	2-5%	nya	825000
1990	448	289	0	nya	nya
1991	272	197	0	nya	nya
1992	322	228	22	619102	551151
1993	161	117	2	462561	398142
1994	28	20	3	296163	420866
1995	48	43	15	540869	467427
1996	380	282	0	1047542	790422
1997	296	200	3	899119	815570
1998	355	177	44	1039781	770419
1999	393	180	39	1126032	827665
2000	308	189	8	857836	618822
2001	265	209	15	768071	nya

Comments:

text from HGMP 10 October 2002:

The annual broodstock collection goal is a maximum of 630 adult spring Chinook salmon. The goal is to have, on a 10 year average, 10% of the hatchery broodstock be of wild fish origin.

The Warm Springs NFH Operation and Implementation Plan 2002-2006 sets a broodstock goal of 630 spring Chinook salmon, assuming

90% pre-spawning survival and a return that is 60% female. When the number of returning males is low, the male to female spawning ratio will be 1:2. Fish that are 60 cm in length or longer are considered adults. Between two and five percent of the broodstock will be composed of jacks, i.e. fish less than 60 cm in length. The percentage reflects the estimated contribution of jacks to the wild spawning population.

**Data source:**

Draft HGMP

---

**7.5 Disposition of hatchery-origin fish collected in surplus of broodstock needs.**

The following procedures are in place that maintain broodstock collection within programmed levels:

[161](#)

- The collection plan for natural origin adults is in place that prevents collection of surplus fish.
- Excess adults are used for seeding available habitat in accordance with genetic guidelines.
- Excess adults are culled at random and sold, buried, or donated to food banks depending on their quality.

**Comments:**

text from HGMP 10 October 2002:

No adverse genetic effects to listed summer steelhead or bull trout are expected from the spring Chinook salmon hatchery broodstock selection process.

Surplus hatchery fish are used to meet the needs of the CTWSRO. Since 2000, approximately 200 adult hatchery spring Chinook salmon have been held at the hatchery and outplanted into Shitike Creek each September. Other surplus fish are killed and distributed to the CTWSRO for tribal needs.

**Data source:**

nds

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**7.6 Fish transportation and holding methods.**

[187](#)

Equipment Type	Capacity (gallons)	Supplemental Oxygen (y/n)	Temperature Control (y/n)	Normal Transit Time (minutes)	Chemical (s) Used	Dosage (ppm)
nya	nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya

[188](#)

Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
2	Oval Ponds	7800	50	26	6	nya
nya	nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya

nya

nya

nya

nya

nya

nya

33

Spawning mortality exceeds 10%.

99

IHOT guidelines for transport are followed for this program.

Comments:

text from HGMP 10 October 2002:

Approximately 200 hatchery adult spring Chinook salmon are outplanted into Shitike Creek during late August and early September. Staff from the CTWSRO use a tank truck to transport fish from the adult holding ponds to five release sites along Shitike Creek.

Egg Transportation

There is no off-station transport of spring Chinook salmon eggs at the present time.

Fingerling Transportation

There is no off-station transport of spring Chinook salmon fingerlings at the present time.

Smolt Transportation

There is no off-station transport of spring Chinook salmon smolts occurring at the present time.

There has been transport of eggs, fingerlings, and smolts to other sites for research purposes by USGS in the past. Emergency conditions at the hatchery may result in the temporary transfer of eggs or juveniles to other hatcheries.

nc

Prespawning mortality of hatchery brood stock is usually lower than 10%, but has been 20 to 30% in some years. Pre-spawning mortality of fish spawning in stream upstream of hatchery has averaged 40%. Adult holding pond covers and a volitional passage system is being tested to minimize pre-spawning mortality of both hatchery and wild fish. D.Olson USFWS 04/23/03

USFWS Guidelines

text from 10 October 2002:

Broodstock fish are held and spawned onsite at the hatchery. Fish designated for outplanting are loaded and sorted during spawning at the hatchery and are trucked to Shitike Creek in a 300 gallon tank truck by the CTWSRO.

Data source:

nds

nds

nds

### 7.7 Describe fish health maintenance and sanitation procedures applied.

- [98](#) "Fish transfers into the subbasin are inspected and accompanied by notifications as described in IHOT and PNFHPC guidelines.
- [32](#) Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection committee (PNFHPC), state or tribal guidelines are followed for broodstock fish health inspection , transfer of eggs or adults and broodstock holding and disposal of carcasses.

**Comments:**

text from HGMP 10 October 2002:

Broodstock fish are held and spawned onsite at the hatchery. Fish designated for outplanting are loaded and sorted during spawning at the hatchery and are trucked to Shitike Creek in a 300 gallon tank truck by the CTWSRO.

**Data source:**

nds

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### 7.8 Disposition of carcasses.

- [32](#) Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection committee (PNFHPC), state or tribal guidelines are followed for broodstock fish health inspection , transfer of eggs or adults and broodstock holding and disposal of carcasses.
- [103](#) Hatchery adults are distributed by staff within the subbasin to provide hatchery adults are distributed (by staff) within the subbasin to provide ecological benefits and hatchery adults are distributed (by staff) within the subbasin to provide natural production.
- The following procedures are in polace that maintain broodstock collection within programmed levels:
- [161](#)
- The collection plan for natural origin adults is in place that prevents collection of surplus fish
  - Excess adults are used for seeding available habitat in accordance with genetic guidelines
  - Excess adults are culled at random and sold, buried, or donated to food banks depending on their quality

**Comments:**

text from HGMP 10 October 2002:

Prior to spawning, surplus fish are distributed to the CTWSRO. After spawning, broodstock carcasses are either buried or used for stream nutrient enrichment. Prior to placement in streams, all carcasses are screened by health exams and treated (by evisceration and heat-baking) to prevent potential disease transmission.

text from HGMP 10 October 2002:

No adverse genetic effects to listed summer steelhead or bull trout are expected from the spring Chinook salmon hatchery broodstock selection process.

Surplus hatchery fish are used to meet the needs of the CTWSRO. Since 2000, approximately 200 adult hatchery spring Chinook salmon have been held at the hatchery and outplanted into Shitike Creek each September. Other surplus fish are killed and distributed to the CTWSRO for tribal needs.

**Data source:**

nds  
nds

**7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.**

[29](#) The program has guidelines for acceptable contribution of hatchery fish to natural spawning.

[30](#) These guidelines are met for all affected natural stocks.

[32](#) Integrated Hatchery Operations Team (IHOT), Pacific Northwest Fish Health Protection committee (PNFHPC), state or tribal guidelines are followed for broodstock fish health inspection , transfer of eggs or adults and broodstock holding and disposal of carcasses.

**Comments:**

text from HGMP 10 October 2002:

No listed fish are used in the WSNFH spring Chinook salmon broodstock. Risk aversion measures for steelhead passage through the collection facility are discussed in Section 2.2.3.  
2002-2006 Hatchery Operation Plan guidelines to limit hatchery spawners to 10% of natural production in Warm Springs River. Warm Springs hatchery adults used in supplementation experiment in Shitike Creek. D.Olson USFWS 04/23/03

**Data source:**

**Section 8. Mating**

**8.1 Selection method.**

[35](#) Males and females available on a given day are mated randomly.

[39](#)

**Comments:**

text from HGMP 10 October 2002:

Spawners are randomly collected over the entire run and randomly spawned from ripe fish over a three to four week period.  
Fish spawning in the stream do.

**Data source:**

nds  
nds

**8.2 Males.**

[38](#) Precocious males are used as a set percentage or in proportion to their contribution to the adult run.

[37](#) Back-up males are not used in the spawning protocol.

Comments:

text from HGMP 10 October 2002:

Approximately 40% of the adults collected are males. The intent is to utilize a spawning population of 630 adults and to use a 1:1 male to female spawning ratio. Between 2% and 5% of the broodstock will be jacks, defined as males less than 60 cm in length.  
text from HGMP 10 October 2002:

No listed fish populations are used in broodstock collection or mating.

Data source:

nds  
nds

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8.3 Fertilization.

[36](#) Gametes are NOT pooled prior to fertilization.

[39](#) IHOT PNFHPC tribal federal other guidelines are followed for culture practices for this program.

[11](#) Disinfection procedures that prevent pathogen transmission between stocks of fish are implemented during spawning.

[40](#) Comments:

text from 10 October 2002:

Ripe fish are separated out during spawning days at the hatchery. A 1:1 male to female spawning ratio is desired, however the actual ratio may differ based on the number of ripe individuals available.

Fluid is taken from each female, and carcasses of both males and females are checked by the fish health staff for signs of Bacterial Kidney Disease. If signs of gross Bacterial Kidney Disease are detected, the fish health staff informs the hatchery and the spawn products of those fish are removed from production. Eggs from each female are placed in separate numbered buckets and sperm from each male is placed in numbered baggies. Sperm is added to the eggs with approximately 16 ounces of water/sperm extender mix. The female number and male number is written on the bucket used to hold the egg/sperm mixture. The bucket of fertilized eggs is poured into a water/iodophor mixture and allowed to sit for 20 minutes. After the 20 minute waiting period fresh water is turned on the eggs. The eggs are then placed in a darkened room, supplied with a constant flow of water, and given weekly applications of formalin until eye-up. During this time the fertilized eggs from each female are kept separate.  
Fish spawning in the stream do.  
Hatchery Specific Developed Guidelines

Follow USFWS Fshish Health Protocols

Data source:

nds  
nds

---

#### 8.4 Cryopreserved gametes.

[162](#) Cryopreserved gametes are not used.

**Comments:**

nc

**Data source:**

nds

---

#### 8.5 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

[35](#) Males and females available on a given day are mated randomly.

[36](#) Gametes are NOT pooled prior to fertilization.

[37](#) Back-up males are not used in the spawning protocol.

[38](#) Precocious males are used as a set percentage or in proportion to their contribution to the adult run.

[39](#)

**Comments:**

text from HGMP 10 October 2002:

Spawners are randomly collected over the entire run and randomly spawned from ripe fish over a three to four week period.  
text from 10 October 2002:

Ripe fish are separated out during spawning days at the hatchery. A 1:1 male to female spawning ratio is desired, however the actual ratio may differ based on the number of ripe individuals available.

Fluid is taken from each female, and carcasses of both males and females are checked by the fish health staff for signs of Bacterial Kidney Disease. If signs of gross Bacterial Kidney Disease are detected, the fish health staff informs the hatchery and the spawn products of those fish are removed from production. Eggs from each female are placed in separate numbered buckets and sperm from each male is placed in numbered baggies. Sperm is added to the eggs with approximately 16 ounces of water/sperm extender mix. The female number and male number is written on the bucket used to hold the egg/sperm mixture. The bucket of fertilized eggs is poured into a water/iodophor mixture and allowed to sit for 20 minutes. After the 20 minute waiting period fresh water is turned on the eggs. The eggs are then placed in a darkened room, supplied with a constant flow of water, and given weekly applications of formalin until eye-up. During this time the fertilized eggs from each female are kept separate.  
text from HGMP 10 October 2002:

No listed fish populations are used in broodstock collection or mating.  
text from HGMP 10 October 2002:

Approximately 40% of the adults collected are males. The intent is to utilize a spawning population of 630 adults and to use a 1:1 male to female spawning ratio. Between 2% and 5% of the broodstock will be jacks, defined as males less than 60 cm in length. Fish spawning in the stream do.

Data source:

nds  
nds  
nds  
nds  
nds

Section 9. Incubation and Rearing.

9.1.1 Number of eggs taken and survival rates to eye-up and/or ponding.

Year	Egg Take	Green-Eyed	Eyed-	Egg Survival	Fry-	Rearing	Fingerling-
		Survival (%)	Ponding Survival (%)	Performance Std.	fingerling Survival (%)	Survival Performance Std.	Smolt Survival (%)
1990	nya	nya	nya	nya	nya	nya	nya
1991	nya	nya	nya	nya	nya	nya	nya
1992	619102A	96	94	nya	nya	nya	94
1993	462561	91	82	nya	nya	nya	nya
1994	296163B	97C	95	nya	nya	nya	nya
1995	540869D	93	92	nya	nya	nya	94
1996	1047542	78	77	nya	nya	nya	98
1997	899119	93	93	nya	nya	nya	98
1998	1039781	95	80	nya	nya	nya	93
1999	1126032	85	75	nya	nya	nya	97
2000	857836	86	85	nya	nya	nya	85
2001	768071	97	89	nya	nya	nya	nya

Comments:

\*Number released is an actual count, other numbers are estimated from sample counts.

A853,102 eggs were taken, 234,000 were discarded.

BIncludes 216,449 green eggs transferred from Round Butte Hatchery.

CIncludes 34,413 eyed eggs transferred from Round Butte Hatchery.

DIncludes 414,689 eggs transferred from Round Butte Hatchery

Data source:



<b>9.1.2 Cause for, and disposition of surplus egg takes.</b>	
<a href="#">163</a>	Policy prohibiting taking extra eggs above and beyond programed numbers.
<a href="#">45</a>	Eggs are not culled randomly over all segments of egg-take.
<a href="#">48</a>	Families are NOT incubated individually.
<a href="#">59</a>	No culling of juveniles occur.
<a href="#">60</a>	
<a href="#">61</a>	
<a href="#">44</a>	1 (eggs are culled once)
<b>Comments:</b>	
If surplus eggs taken, eggs from high titer BKD females are first for culling.	
nc	
nc	
nc	
Use all fish not culling	
For disease - BKD	
<b>Data source:</b>	
nds	
nds	
nds	
nds	
nds	
nds	
<b>9.1.3 Loading densities applied during incubation.</b>	
<a href="#">51</a>	Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations were followed for incubator capacities.
<a href="#">47</a>	Families within spawning groups are NOT mixed randomly at ponding, thus unintentional rearing differences may affect families differently.
<a href="#">42</a>	Eggs are NOT incubated under conditions that result in equal survival of all segments of the population to ponding.
<b>Comments:</b>	
nc	
nc	
text from HGMP 10 October 2002:	
5,000 eggs per Heath tray	
<b>Data source:</b>	
nds	
nds	
nds	

9.1.4 Incubation conditions.

- 49
- Incubation takes place in home stream water.
- 50
- The program does NOT use water sources that result in hatching/emergence timing similar to that of the naturally produced population.
- 51
- Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations were followed for incubator capacities.
- 53
- Eggs are monitored when needed to determine fertilization efficiency and embryonic development.
- 42
- Eggs are NOT incubated under conditions that result in equal survival of all segments of the population to ponding.
- 47
- Families within spawning groups are NOT mixed randomly at ponding, thus unintentional rearing differences may affect families differently.
- 48
- Families are NOT incubated individually.

43

Comments:

text from HGMP 10 October 2002:

Eggs are kept at 50 degrees F, left undisturbed until eye-up, and then electronically counted, 5,000 per Heath tray.

nc

nc

text from HGMP 10 October 2002:

Formalin is run through the watering system on the eggs until eye-up. After eye-up and during counting, dead eggs are removed by an electronic counter, weighed, sampled, and discarded. After counting, dead eggs are manually picked from the trays and subtracted from the egg count. At ponding, 60 fish are sampled for a health exam.

nc

nc

nc

Occasionally

Data source:

nds

nds

nds

nds

nds

nds

nds

nds

---

9.1.5 Ponding.

The procedures used for determining when fry are ponded include:

- 55
- Fry are removed from incubation units when 80-90% of observed fry have yolk-sac material that is 80-90% utilized and contained within body cavity ("button-up")
  - Fry are ponded based on visual inspection of the amount of yolk remaining
- 46
- Eggs are NOT incubated in a manner that allows volitional ponding of fry.

Comments:

text from HGMP 10 October 2002:

At complete button-up (1,600 temperature units, 1,100 fish per pound) fry are moved into tanks. Ponding usually begins near the end of January and is completed by the end of February.

nc

Data source:

nds

nds

9.1.6

Fish health maintenance and monitoring.

52

53

Eggs are monitored when needed to determine fertilization efficiency and embryonic development.

54

Following eye-up stage, eggs are inventoried, and dead or undeveloped eggs removed and disposed of as described in the disease control guidelines.

56

Dead or culled eggs are discarded in a manner that prevents transmission to receiving watershed.

Comments:

nc

text from HGMP 10 October 2002:

Formalin is run through the watering system on the eggs until eye-up. After eye-up and during counting, dead eggs are removed by an electronic counter, weighed, sampled, and discarded. After counting, dead eggs are manually picked from the trays and subtracted from the egg count. At ponding, 60 fish are sampled for a health exam.

nc

nc

Data source:

nds

nds

nds

nds

9.1.7

Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

47

Families within spawning groups are NOT mixed randomly at ponding, thus unintentional rearing differences may affect families differently.

49

Incubation takes place in home stream water.

50

The program does NOT use water sources that result in hatching/emergence timing similar to that of the naturally produced population.

51

Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations were followed for incubator capacities.

52

56

Dead or culled eggs are discarded in a manner that prevents transmission to receiving watershed.

61

dna

Comments:

nc  
text from HGMP 10 October 2002:

Eggs are kept at 50 degrees F, left undisturbed until eye-up, and then electronically counted, 5,000 per Heath tray.  
nc  
nc  
nc  
nc  
Use all fish not culling

Data source:

nds  
nds  
nds  
nds  
nds  
nds  
nds

9.2.1 Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1990-2001), or for years dependable data are available.

Year	Egg Take	Green-Eyed	Eyed-	Egg Survival	Fry-	Rearing	Fingerling-
		Survival (%)	Ponding Survival (%)	Performance Std.	fingerling Survival (%)	Survival Performance Std.	Smolt Survival (%)
1990	nya	nya	nya	nya	nya	nya	nya
1991	nya	nya	nya	nya	nya	nya	nya
1992	619102A	96	94	nya	nya	nya	94
1993	462561	91	82	nya	nya	nya	nya
1994	296163B	97C	95	nya	nya	nya	nya
1995	540869D	93	92	nya	nya	nya	94
1996	1047542	78	77	nya	nya	nya	98
1997	899119	93	93	nya	nya	nya	98
1998	1039781	95	80	nya	nya	nya	93
1999	1126032	85	75	nya	nya	nya	97
2000	857836	86	85	nya	nya	nya	85
2001	768071	97	89	nya	nya	nya	nya

Comments:

\*Number released is an actual count, other numbers are estimated from sample counts.  
  
A853,102 eggs were taken, 234,000 were discarded.  
  
BIncludes 216,449 green eggs transferred from Round Butte Hatchery.

CIncludes 34,413 eyed eggs transferred from Round Butte Hatchery.

DIncludes 414,689 eggs transferred from Round Butte Hatchery

**Data source:**

Draft HGMP

**9.2.2 Density and loading criteria (goals and actual levels).**

- 71
- The juvenile rearing density and loading guidelines used at the facility are based on: life-stage specific survival studies conducted on-site and life-stage specific survival studies conducted at other facilities .
- 72
- IHOT standards are followed for: water quality , predator control measures to provide the necessary security for the cultured stock , loading and density.

**Comments:**

text from HGMP 10 October 2002:

Pond densities range from a density index of 0.08 (approximately 0.44 lbs fish/ft3) to a density index of 0.16 (approximately 0.88 lbs fish/ft3), based on an average fish size of 20 fish/lb.

Density and loading criteria vary with annual production goals. Current production goals allow for density indices to be kept at or below 0.5, and flow indices to be within accepted standards for spring Chinook salmon (Piper et al. 1982)

nc

**Data source:**

nds

nds

**9.2.3 Fish rearing conditions.**

- 66
- The program uses a diet and growth regime that mimics natural seasonal growth patterns.
- 67
- Settleable solids, unused feed and feces are removed periodically to ensure proper cleanliness of rearing containers.
- 72
- IHOT standards are followed for: water quality , predator control measures to provide the necessary security for the cultured stock , loading and density.
- 71
- The juvenile rearing density and loading guidelines used at the facility are based on life-stage specific survival studies conducted on-site and life-stage specific survival studies conducted at other facilities .

**Comments:**

nc

text from HGMP 10 October 2002:

Temperatures in the rearing ponds are monitored daily. Dissolved oxygen levels are monitored on a monthly, weekly, or daily basis as

needed. Temperatures during the rearing cycle range from between 32 degrees F to 72 degrees F. Ponds are cleaned by brush twice a week during the summer.

nc

text from HGMP 10 October 2002:

Pond densities range from a density index of 0.08 (approximately 0.44 lbs fish/ft3) to a density index of 0.16 (approximately 0.88 lbs fish/ft3), based on an average fish size of 20 fish/lb.

Density and loading criteria vary with annual production goals. Current production goals allow for density indices to be kept at or below 0.5, and flow indices to be within accepted standards for spring Chinook salmon (Piper et al. 1982)

Data source:

nds  
nds  
nds  
nds

9.2.4

Indicate biweekly or monthly fish growth information (average program performance), including length, weight, and condition factor data collected during rearing, if available.

	Rearing Period	Length (mm)	Weight (fpp)	Condition Factor	Growth Rate	Hepatosomatic Index	Body Moisture Content
	Jan 00	36	1098	nya	nya	nya	nya
	Feb 00	48	448	nya	nya	nya	nya
	Mar 00	51	389	nya	nya	nya	nya
	Apr 00	60	228	nya	nya	nya	nya
	May 00	74	122	nya	nya	nya	nya
194	Jun 00	99	52	nya	nya	nya	nya
	Jul 00	112	36	nya	nya	nya	nya
	Aug 00	112	36	nya	nya	nya	nya
	Sep 00	112	36	nya	nya	nya	nya
	Oct 00	128	24	nya	nya	nya	nya
	Nov 00	128	24	nya	nya	nya	nya
	Dec 00	128	20	nya	nya	nya	nya

Comments:

For Brood Year 1999

Data source:

Draft HGMP

9.2.5

Indicate monthly fish growth rate and energy reserve data (average program performance), if available.

- 64
- Operator conducts periodic feed quality analysis.
  - Feed is stored under proper conditions as described by IHOT guidelines.
- 65
- The correct amount and type of food is provided to achieve the desired growth rate , body composition and condition factorsfor the species and life stages being reared.

194

Rearing Period	Length (mm)	Weight (fpp)	Condition Factor	Growth Rate	Hepatosomatic Index	Body Moisture Content
Jan 00	36	1098	nya	nya	nya	nya
Feb 00	48	448	nya	nya	nya	nya
Mar 00	51	389	nya	nya	nya	nya
Apr 00	60	228	nya	nya	nya	nya
May 00	74	122	nya	nya	nya	nya
Jun 00	99	52	nya	nya	nya	nya
Jul 00	112	36	nya	nya	nya	nya
Aug 00	112	36	nya	nya	nya	nya
Sep 00	112	36	nya	nya	nya	nya
Oct 00	128	24	nya	nya	nya	nya
Nov 00	128	24	nya	nya	nya	nya
Dec 00	128	20	nya	nya	nya	nya

66

The program uses a diet and growth regime that mimics natural seasonal growth patterns.

Comments:

text from HGMP 10 October 2002:

Biomoist grower and Biomoist feed is used during rearing. Erythromycin feed (21 days) is used in May and September. Feeding rates range from 1.5% to 3% B.W./day. Conversion rates averaged 1.62 for BY 1999.

nc

For Brood Year 1999

nc

Data source:

nds

nds

Draft HGMP

nds

9.2.6

Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (average program performance).

- 64
  - Operator conducts periodic feed quality analysis.
  - Feed is stored under proper conditions as described by IHOT guidelines.
- 65

The correct amount and type of food is provided to achieve the desired growth rate , body composition and condition factorsfor the species and life stages being reared.

195

Rearing Period	Food Type	Application Schedule (#feedings/day)	Feeding Rate Range (% B.W./day)	Lbs. Fed Per gpm of Inflow	Food Conversion During Period
Jan-Dec	Biomoist Grower & Biomoist Feed	nya	1.5-3	nya	1.62 in 1999
nya	Use Erythromycin feed (21days) in May and Sept	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya

Comments:

text from HGMP 10 October 2002:

Biomoist grower and Biomoist feed is used during rearing. Erythromycin feed (21 days) is used in May and September. Feeding rates range from 1.5% to 3% B.W./day. Conversion rates averaged 1.62 for BY 1999.

nc  
nc

Data source:

nds  
nds  
nds

9.2.7 Fish health monitoring, disease treatment, and sanitation procedures.

- 62

IHOT fish health guidelines are followed to prevent transmission between lots of fish on site or transmission or amplification to or within the watershed.
- 63

Whenever possible, vaccines are used to minimize the use of antimicrobial compounds.
- 71

The juvenile rearing density and loading guidelines used at the facility are based on life-stage specific survival studies conducted on-site and life-stage specific survival studies conducted at other facilities .

Comments:

nc  
text from HGMP 10 October 2002:

Fish health is monitored daily by hatchery staff. A fish health specialist visits at least once per month to examine fish in each lot, checking both healthy and symptomatic fish in the rearing ponds. If necessary, the appropriate chemotherapy or cultural changes are administered



after consultation with the fish health specialist. Sanitation procedures follow guidelines established by the Fish Hatchery Management manual (Piper et al. 1982).  
text from HGMP 10 October 2002:

Pond densities range from a density index of 0.08 (approximately 0.44 lbs fish/ft<sup>3</sup>) to a density index of 0.16 (approximately 0.88 lbs fish/ft<sup>3</sup>), based on an average fish size of 20 fish/lb.

Density and loading criteria vary with annual production goals. Current production goals allow for density indices to be kept at or below 0.5, and flow indices to be within accepted standards for spring Chinook salmon (Piper et al. 1982)

**Data source:**

nds  
nds  
nds

---

**9.2.8 Smolt development indices (e.g. gill ATPase activity), if applicable.**

[87](#) The migratory state of the release population is determined by volitional release and other criteria.

**Comments:**

historical timing of wild outmigration

**Data source:**

nds

---

**9.2.9 Indicate the use of "natural" rearing methods as applied in the program.**

[68](#) The program attempts to better mimic the natural rearing environment by reducing rearing density below agency or other guidelines) and providing natural or artificial cover.

[69](#) Fish produced are qualitatively similar to natural fish in health and other characteristics.

[66](#) The program uses a diet and growth regime that mimics natural, seasonal growth patterns.

[84](#) Fish are released at sizes similar to natural fish of the same life stage and species.

[88](#) Fish are released in a manner that simulates natural seasonal migration patterns.

**Comments:**

Rearing density experiments on-going D.Olson USFWS 04/23/03  
NATURES type evaluations are planned. D.Olson USFWS 04/23/03

text from HGMP 10 October 2002:

9.2.9) Indicate the use of "natural" rearing methods as applied in the program:

Shade coverings have been installed over each rearing pond.

nc  
text from HGMP 10 October 2002:

Release times were chosen to mimic the life history characteristics of the wild spring Chinook salmon population in the Warm Springs River (Olson et al. 1995). The fall release is a strictly volitional release while spring releases are a combination of volitional and forced releases.  
Fall and Spring releases

Data source:

nds  
nds  
nds  
nds  
nds

9.2.10

Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

- 60
- When juveniles are culled, it is done randomly over all segments of the population.
- 72
- IHOT standards are followed for: water quality , predator control measures to provide the necessary security for the cultured stock , loading and density.
- 80
- The facility is continuously staffed to assure the security of fish stocks on-site.
- 84
- Fish are released at sizes similar to natural fish of the same life stage and species.
- 88
- Fish are released in a manner that simulates natural seasonal migration patterns.
- 98
- "Fish transfers into the subbasin are inspected and accompanied by notifications as described in IHOT and PNFHPC guidelines.
- 76
- Fish inventory data accurately reflect rearing vessel population abundance with 10%.
- 86
- Volitional release is practiced during natural out-migration timing.
- 96
- Fish are released in the same subbasin as the final rearing facility.

Comments:

nc  
nc  
On-site housing  
text from HGMP 10 October 2002:

Release times were chosen to mimic the life history characteristics of the wild spring Chinook salmon population in the Warm Springs River (Olson et al. 1995). The fall release is a strictly volitional release while spring releases are a combination of volitional and forced releases.  
Fall and Spring releases  
text from HGMP 10 October 2002:

Broodstock fish are held and spawned onsite at the hatchery. Fish designated for outplanting are loaded and sorted during spawning at the hatchery and are trucked to Shitike Creek in a 300 gallon tank truck by the CTWSRO.

nc

nc

text from HGMP 10 October 2002:

All juvenile releases currently occur onsite at Warm Springs NFH. Beginning in 2000, approximately 200 adult fish have been outplanted into Shitike Creek annually. The adult fish are transported using a 300 gallon tank truck with aerated water.

Data source:

nds

nds

nds

nds

nds

nds

nds

nds

nds

Section 10. Release

10.1 Proposed fish release levels.								
	Age Class	Maximum Number	Size (ffp)	Release Date	Stream	Location		Ecoprovince
						Release Point (RKm)	Major Watershed	
1	Eggs	0	nya	nya	nya	nya	nya	nya
	Unfed Fry	0	nya	nya	nya	nya	nya	nya
	Fry	0	nya	nya	nya	nya	nya	nya
	Fingerling	75000	6-22	Oct - Nov	Warm Springs	16	Deschutes River	Columbia Plateau
	Yearling	750000	9-22	Mar - Apr	Warm Springs	16	Deschutes River	Columbia Plateau
Comments:								
nc								
Data source:								
nds								

10.2 Specific location(s) of proposed release(s).								
	Age Class	Maximum Number	Size (ffp)	Release Date	Stream	Location		Ecoprovince
						Release Point (RKm)	Major Watershed	
	Eggs	0	nya	nya	nya	nya	nya	nya

1	Unfed Fry	0	nya	nya	nya	nya	nya	nya
	Fry	0	nya	nya	nya	nya	nya	nya
	Fingerling	75000	6-22	Oct - Nov	Warm Springs	16	Deschutes River	Columbia Plateau
	Yearling	750000	9-22	Mar - Apr	Warm Springs	16	Deschutes River	Columbia Plateau

96 Fish are released in the same subbasin as the final rearing facility.

Comments:

nc  
text from HGMP 10 October 2002:

All juvenile releases currently occur onsite at Warm Springs NFH. Beginning in 2000, approximately 200 adult fish have been outplanted into Shitike Creek annually. The adult fish are transported using a 300 gallon tank truck with aerated water.

Data source:

nds  
nds

10.3 Actual numbers and sizes of fish released by age class through the program.

>

Release Year	Eggs/Unfed Fry Release			Fry Release			Fingerling Release			Yearling Release		
	Number	Date (MM/DD)	Avg Size (fpp)	Number	Date (MM/DD)	Avg size (fpp)	Number	Date (MM/DD)	Avg Size (fpp)	Number	Date (MM/DD)	Avg Size (fpp)
1991	nya	nya	nya	nya	nya	nya	8521	11/04	6	816420	04/17, 04/22	14.8
1992	nya	nya	nya	nya	nya	nya	47257	10/01, 11/16	21	650986	04/22	12
1993	nya	nya	nya	nya	nya	nya	23099	11/15	21	509757	04/22	17
1994	nya	nya	nya	nya	nya	nya	16497	11/16	13	527565	04/20	16
1995	nya	nya	nya	nya	nya	nya	53001	11/22	14	381645	03/31	11
1996	nya	nya	nya	nya	nya	nya	30394	11/13	12	367885	04/10	11
1997	nya	nya	nya	nya	nya	nya	90809	11/14	16	437033	04/16	9
1998	nya	nya	nya	nya	nya	nya	35718	11/09	20	699613	04/15	22
1999	nya	nya	nya	nya	nya	nya	91377	11/17	18	775852	03/04	19
2000	nya	nya	nya	nya	nya	nya	42921	11/15	22	679042	04/19	15
2001	nya	nya	nya	nya	nya	nya	57975	11/14	22	784744	04/18	19
2002	nya	nya	nya	nya	nya	nya	nya	nya	nya	nya	nya	nya
Avg	nya	nya	nya	nya	nya	nya	45234	11/15	17	602777	04/18	15

196

Comments:

nc

Data source:

Draft HGMP

10.4 Actual dates of release and description of release protocols.

- 84
- Fish are released at sizes similar to natural fish of the same life stage and species.
- 85
- Fish are released at a time, size, location, and in a manner that achieves harvest goals for the stock.
- 86
- Volitional release during natural out-migration timing is practiced.
- 88
- Fish are released in a manner that simulates natural seasonal migration patterns.
- 89
- 
- 90
- 
- 91
- Fish are released at a time and size specified in an established juvenile production goal.
- 92
- The carrying capacity of the subbasin has NOT been taken into consideration in sizing this program.
- 87
- The migratory state of the release population is determined by volitional release and other criteria .

Comments:

nc

nc

text from HGMP 10 October 2002:

Release times were chosen to mimic the life history characteristics of the wild spring Chinook salmon population in the Warm Springs River (Olson et al. 1995). The fall release is a strictly volitional release while spring releases are a combination of volitional and forced releases.

Fall and Spring releases

On-going studies of time and size at release. D.Olson USFWS 04/23/03

nc

nc

nc

historical timming of wild outmigration

Data source:

nds  
nds  
nds  
nds  
nds  
nds  
nds  
nds  
nds

10.5 Fish transportation procedures, if applicable.

- 96
- Fish are released in the same subbasin as the final rearing facility.

187

Equipment Type	Capacity (gallons)	Supplemental Oxygen (y/n)	Temperature Control (y/n)	Normal Transit Time (minutes)	Chemical (s) Used	Dosage (ppm)
nya	nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya
nya	nya	nya	nya	nya	nya	nya

Comments:

text from HGMP 10 October 2002:

All juvenile releases currently occur onsite at Warm Springs NFH. Beginning in 2000, approximately 200 adult fish have been outplanted into Shitike Creek annually. The adult fish are transported using a 300 gallon tank truck with aerated water.  
text from HGMP 10 October 2002:

Approximately 200 hatchery adult spring Chinook salmon are outplanted into Shitike Creek during late August and early September. Staff from the CTWSRO use a tank truck to transport fish from the adult holding ponds to five release sites along Shitike Creek.

Egg Transportation

There is no off-station transport of spring Chinook salmon eggs at the present time.

Fingerling Transportation

There is no off-station transport of spring Chinook salmon fingerlings at the present time.

Smolt Transportation

There is no off-station transport of spring Chinook salmon smolts occurring at the present time.

There has been transport of eggs, fingerlings, and smolts to other sites for research purposes by USGS in the past. Emergency conditions at the hatchery may result in the temporary transfer of eggs or juveniles to other hatcheries.

Data source:

nds  
nds

10.6 Acclimation procedures (methods applied and length of time).

Does not apply.

166

text from HGMP 10 October 2002:

The water source for Warm Springs NFH is the Warm Springs River. Fish are reared and released onsite.

**Comments:**

nc

**Data source:**

nds

100101102

**10.7 Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.**

Marking techniques are used to distinguish among hatchery population segments.

100% of the hatchery fish released are marked so that they can be distinguished from the natural population.

Marked fish can be identified using non-lethal means.

**Comments:**

Being implemented per Columbia Plateau HGMP workshop, April 2004.

text from HGMP 10 October 2002:

All juvenile Warm Springs NFH spring Chinook salmon are adipose-fin clipped and coded-wire tagged prior to release. The USFWS samples juvenile fish for mark quality and tag retention prior to release. The program goal is a minimum tag retention rate of 95%. The automated fish passage system sorts returning hatchery and wild fish based on the presence of coded-wire tags.

nc

nc

**Data source:**

nds

nds

167

**10.8 Disposition plans for fish identified at the time of release as surplus to programmed or approved levels**

No surplus.

Text from HGMP 10 October 2002:

No broodstock or eggs are taken beyond approved levels.

163

Policy prohibiting taking extra eggs above and beyond programed numbers.

Comments:

nc

nc

Data source:

nds

nds

10.9

Fish health certification procedures applied pre-release.

97

All fish are examined for the presence of "reportable pathogens" as defined in the PNFHPC disease control guidelines, within 3 weeks prior to release.

98

Fish transfers into the subbasin are inspected and accompanied by notifications as described in IHOT and PNFHPC guidelines.

Comments:

text from HGMP 10 October 2002:

Hatchery operations comply with the USFWS Fish Health Policy and Implementation Guidelines and the Integrated Hatchery Operations Team?s Fish Health Policy. Three to six weeks prior to release, 60 fish from each lot are given a health exam. If fish are held longer than one month past the designated release date a second health exam is performed.

text from HGMP 10 October 2002:

Broodstock fish are held and spawned onsite at the hatchery. Fish designated for outplanting are loaded and sorted during spawning at the hatchery and are trucked to Shitike Creek in a 300 gallon tank truck by the CTWSRO.

Data source:

nds

nds

10.10

Emergency release procedures in response to flooding or water system failure.

Pull the boards.

168

text from HGMP 10 October 2002:

Juvenile fish can be released onsite into the Warm Springs River in response to emergency conditions.

Comments:

nc

Data source:

nds



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**10.11 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.**

- [84](#) Fish are released at sizes similar to natural fish of the same life stage and species.
- [86](#) Volitional release during natural out-migration timing is practiced.
- [88](#) Fish are released in a manner that simulates natural seasonal migration patterns.
- [89](#)
- [91](#) Fish are released at a time and size specified in an established juvenile production goal.
- [104](#) The percent of the naturally spawning population in the subbasin that consists of adults from the program is 5-30% (between five and thirty percent).
- The percent of hatchery fish spawning in the wild is estimated by:
- [105](#)
- Annual stream surveys (e.g. carcasses)
  - Escapement data from a weir or dam
  - Harvest records, creel surveys
- [95](#) Fish are released at times of the year and sizes to allow adoption of multiple life history strategies.
- [94](#) Fish are released within the historic range for that stock.
- [93](#) The carrying capacity of the subbasin was taken into account when determining the number of fish to be released.

**Comments:**

text from HGMP 10 October 2002:

Release times were chosen to mimic the life history characteristics of the wild spring Chinook salmon population in the Warm Springs River (Olson et al. 1995). The fall release is a strictly volitional release while spring releases are a combination of volitional and forced releases.

nc

Fall and Spring releases

On-going studies of time and size at release. D.Olson USFWS 04/23/03

nc

nc

Warm Springs River and Shitike Creek.

nc

nc

nc

nc

nc

**Data source:**

nds

nds

nds

nds

nds

nds

nds

nds

nds

nds

**Section 11. Monitoring and Evaluation of Performance Indicators****11.1.1 Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.**

1) A subsample of wild and hatchery fish are biosampled in order to collect length, age, sex, and coded-wire tag information for adult fish. The USFWS operates a fish barrier dam and adult fish ladder adjacent to the fish hatchery on the Warm Springs River. Approximately 10% of the wild run and 40% of the hatchery run are sampled at the hatchery. The CTWSRO operates a migrant traps downstream of the hatchery on the Warm Springs River and near the mouth of Shitike Creek that monitor juvenile outmigration timing of wild and hatchery fish.

Run timing of wild spring Chinook salmon is monitored at the hatchery fish ladder. Broodstock for the hatchery program are collected based on historical run timing averages of the wild run.

Creel surveys conducted by the CTWSRO and the Oregon Department of Fish and Wildlife (ODFW), coded-wire tag recoveries, and hatchery returns are used to estimate the contribution of Warm Springs NFH spring Chinook salmon to various fisheries.

Adults are selected for outplanting in Shitike Creek at spawn time in the hatchery. Redd surveys, radio-telemetry, genetic surveys, and juvenile monitoring will be used to evaluate the contribution of Warm Spring NFH spring Chinook salmon to natural production in Shitike Creek.

Specialists from the Lower Columbia River Fish Health Center (LCRFHC) will inspect adult broodstock yearly and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, the LCRFHC will recommend remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary.

Three to six weeks prior to release or transfer, 60 fish from each lot will be given a health exam by fish health specialists from the LCRFHC. All juvenile fish at the hatchery are externally marked and coded-wire tagged (CWT) prior to release. Juvenile fish are sampled by the USFWS for mark quality and tag retention prior to release. The tag retention goal at release is a minimum of 95%.

Smolt to adult survival rates are estimated for each brood year. Creel surveys conducted by CTWSRO and ODFW sample fish caught in fisheries in the Deschutes River. A subsample of hatchery spring Chinook salmon returning to the hatchery are biosampled. Coded-wire tag recoveries are used to estimate the age structure of returning fish.

Wild spring Chinook salmon abundance is monitored as fish pass through the fish ladder at Warm Springs NFH. The CTWSRO and USFWS will conduct redd surveys in order to estimate spawning abundance.

During the steelhead migration period all fish are sorted by hand. All hatchery steelhead, identified as having missing or deformed fins, are killed at the hatchery and distributed to the CTWSRO. All wild steelhead are passed upstream. The disposition of each fish handled is recorded in fish removal database files maintained by the USFWS Columbia River Fisheries Program Office.

Fish passed upstream are monitored either manually or through a video-monitor system.

All carcasses are screened by the fish health center for disease prior to being outplanted into the stream. Carcasses are treated (by evisceration and heat-baking) to prevent potential disease transmission.

Monitoring programs will be incorporated into project designs. Examples of project designs include diet studies, rearing density studies, and rearing environment projects.

Effectively communicate with other salmon producers, managers, and the public in the Columbia River Basin.

Environmental monitoring of total suspended solids, settleable solids, in-hatchery water temperatures, in hatchery dissolved oxygen, nitrogen, ammonia, and pH is conducted annually at the hatchery.

Trapping efficiency is evaluated on a regular basis. During efficiency testing upstream bound fish will be held overnight and then manually examined for fin clips and the presence of coded-wire tags. Video monitoring is used to estimate wild fish passage above the hatchery.

The CTWSRO and USFWS formulate a pre-season run prediction for Warm Springs River stocks returning to the Deschutes River. The CTWSRO and ODFW co-manage and monitor the fishery in order to ensure that impacts to wild fish are minimized.

A juvenile trap located downstream of Warm Springs NFH monitors the outmigration of hatchery and wild fish. Juvenile releases may also be monitored using radio telemetry, PIT tagging, snorkeling, trapping, or other techniques.

Coded-wire tag recoveries throughout the Columbia basin are recorded and summarized in order to estimate the amount of straying of Warm Springs NFH spring Chinook salmon.

Screens are monitored by hatchery personnel on a regular basis.

Juvenile fish health is monitored on at least a monthly basis at the hatchery in order to detect potential disease problems. A fish health specialist will examine affected fish and make recommendations on remedial or preventative measures. Therapeutic and prophylactic treatments will be administered upon consultation with the fish health specialist and in accordance with USFWS and the Integrated Hatchery Operation Team's policies. Wild fish used in the broodstock are checked for disease. Wild fish juveniles in the stream are periodically checked, as identified in the hatchery operations plan.

**Comments:**

nc

**Data source:**

Draft HGMP

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**11.1.2 Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.**[146](#)

The USFWS expects to continue to fund monitoring and evaluation programs associated with Warm Springs NFH.

**Comments:**

nc

**Data source:**

Draft HGMP

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**11.2 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.**

Incidental take of summer steelhead could occur through activities associated with the Warm Springs NFH adult collection facility. A fish barrier dam, adjacent to the hatchery, blocks upstream passage of all fish and directs them into a fish ladder located at the hatchery. Upon entering the fish ladder, fish are either directed into holding ponds or passed upstream above the barrier dam. An automated fish passage system is used during the spring Chinook salmon migration period, generally from May through the end of September. The automated passage system is designed to minimize handling of wild fish by passively separating returning hatchery spring Chinook salmon, identified by the presence of coded-wire tags, from wild fish. The passage system uses a 15-foot long denil steep pass fishway with a coded-wire tag tube detector and gate. As fish swim through the fishway and tube detector, coded-wire tagged fish are detected and a gate opens that shunts them into a holding pond. Non coded-wire tagged fish do not trigger the gate and are able to continue migrating up through the fish ladder and upstream of the barrier dam. A video system records non-coded wire tagged fish as they pass upstream of the hatchery. The video system allows hatchery personnel to monitor the number, species, and origin of fish passing upstream. During operation of the automated passage system wild fish are not handled by hatchery personnel, thereby reducing the potential take of listed species. Migration delays as fish find their way into the fish ladder and through the passage system, rejection of the fish ladder resulting in displaced spawning, and injuries suffered as adults try to jump the barrier dam are potential incidental takes associated with the barrier dam. The actual level of incidental take associated with the barrier dam is unknown at this time. Based on observations by hatchery personnel of fish movements through the barrier dam and passage system, the level of take is assumed to be low (Mike Paiya, USFWS Warm Springs NFH, pers. comm.).

The automated passage system is only used during the spring Chinook salmon migration period, generally from April 15 to September 30. The proper functioning of the passage system relies on 100% coded-wire tagging of hatchery fish, with all non coded-wire tagged fish passed upstream. All spring Chinook salmon juveniles released from Warm Springs NFH are coded-wire tagged (the tag retention goal is 95%) but stray hatchery fish from hatcheries outside the subbasin may not be coded-wire tagged. The Warm Springs River, and the Deschutes River subbasin in general, has a high incidence of stray hatchery steelhead (Olson and Pastor 1998). In order to preserve the genetic integrity of wild steelhead in the Warm Springs River, it is the policy of Warm Springs NFH to pass only wild (unmarked) steelhead above the barrier dam. In order to accomplish this goal, the automated fish passage system is not used until the steelhead migration has ended, usually sometime in late April. During the steelhead migration period fish find their way into the fish ladder and into a holding pond. Hatchery personnel then hand sort the fish. Fish are sedated using CO<sub>2</sub>, sorted, measured, and then either passed upstream or collected for the hatchery. All wild summer steelhead, bull trout, and other indigenous fish species are passed upstream. Stray hatchery steelhead, identified as having missing or deformed fins, are held in holding ponds, killed, and distributed to the CTWSRO.

Incidental take of listed species may occur during the manual sorting of fish in the fish ladder at Warm Springs NFH. Potential take could occur as a result of delay in migration timing, stress associated with handling, or misidentification of wild and hatchery steelhead. Hatchery personnel attempt to minimize handling stress on fish by following the appropriate fish handling guidelines. Direct take on listed species as a result of the fish barrier dam, fish ladder, and hatchery sorting procedures has been minimal. Three unmarked adult steelhead were accidentally killed in 1998. No other mortality of unmarked adult steelhead at the hatchery has been recorded since 1995 (CRIS Database 3/18/02).

Monitoring activities associated with the Warm Springs spring Chinook program also have the potential for incidental take of listed steelhead and bull trout. A rotary screw trap, located at approximately Rkm 5 of the Warm Springs River, is operated by the CTWSRO in order to gather outmigration timing and population estimates for juvenile spring Chinook salmon. The trap is typically operated from mid-March through mid-November. Juvenile spring Chinook salmon collected at the trap are anesthetized with MS-222, measured, weighed, and a subsample is marked and released upstream for mark-recapture population estimates. Some juvenile spring Chinook salmon may be implanted with radio-tags in order to monitor their migration behavior in the Deschutes River (See Section 12). Listed juvenile steelhead and bull trout are also collected at the trap. Juvenile steelhead and juvenile resident trout are visually indistinguishable and are summarized together for monitoring purposes. Juvenile steelhead will be handled, measured, and marked using the same procedures as for spring Chinook salmon. For an estimate of the number of steelhead trapped see Take Table 1. The probability of capture for juvenile bull trout in the trap is low, with fewer than ten bull trout trapped per year (Bob Spateholts, CTWSRO Warm Springs, pers. comm). If juvenile bull trout are collected at the trap they will be weighed, measured, marked, and released upstream.

Incidental take of juvenile summer steelhead may occur through stress associated with the handling and marking procedures. Procedures associated with the juvenile trap are designed to minimize stress and potential take. The traps are checked regularly in order to minimize the amount of time fish are held at the trap. The amount of time fish are under anesthetic is carefully monitored and fish are allowed sufficient time to recover before being released back into the river. The potential for direct take of listed species at the traps as a result of trap malfunction or predator intrusion is considered to be low. The CTWSRO have observed mink predation on fish caught in the screw trap (Bob Spateholts, CTWSRO Warm Springs, pers. comm.). If recurring predators become a problem, live traps may be set to relocate the predators away from the trap site. During periods of high flows debris may clog the rotary screw mechanism or live box, possibly resulting in descaling or wounding of fish in the trap. Daily monitoring of the trap is expected to minimize take associated with trap malfunction or predator intrusion. If high flows are anticipated, the trap is raised in order to reduce the likelihood of trap malfunction. The traps are also deactivated when water temperatures exceed 20 degrees Celsius or if there are visible signs of stress in fish in the live box. Estimated take levels for listed steelhead in the Warm Springs River are summarized in Take Table 1.

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The USFWS expects to conduct research and monitoring activities at the hatchery and in the stream environment that will focus on the ecological interactions of hatchery and wild fish in the Warm Springs River, Shitike Creek, and Deschutes River. The research program is intended to gather information that will help managers evaluate hatchery practices and reduce impacts of the hatchery program on wild fish populations. Proposed research activities associated with Warm Spring NFH are discussed in detail in Section 12. Sampling of spring Chinook salmon will occur through the normal hatchery and monitoring activities on the Warm Springs River. Incidental take associated with the research program is expected to be minimal. Up to 100 juvenile spring Chinook salmon will be implanted with radio-tags at the rotary screw trap on the Warm Springs River. Other research activities on the Warm Springs River include expanded redd surveys and tissue sampling for genetic pedigree analysis of hatchery spring Chinook salmon at the Warm Springs NFH.

The USFWS and the CTWSRO also anticipate conducting monitoring and research activities on Shitike Creek. Shitike Creek is small tributary of the Deschutes River that is located on the Warm Springs Reservation. Since 2000, the USFWS and the CTWSRO have outplanted Warm Springs NFH adult spring Chinook salmon into Shitike Creek. The objectives of the monitoring and research program are as follows:

- 1) Evaluate the contribution of outplanted spring Chinook salmon to the natural production in Shitike Creek.
- 2) Investigate the potential ecological interactions of spring Chinook, bull trout, and summer steelhead in Shitike Creek.

As part of the monitoring program, adult spring Chinook salmon will be sampled at a temporary weir located near the mouth of Shitike Creek. The temporary weir is operated by the CTWSRO as part of a bull trout monitoring program funded by the Bonneville Power Administration. The weir is typically installed in late April or early May, after the main upstream migration of adult summer steelhead. Adult fish migrating upstream are trapped at the weir and sampled by CTWSRO personnel. Sampling includes taking length measurements and scale samples. As part of the spring Chinook salmon program, tissue and scale samples will be collected from all upstream migrating spring Chinook salmon. Incidental take of steelhead may occur at the weir as a result of handling stress or delayed migration, although the weir is typically installed after the steelhead migration (Take Table 2).

Juvenile sampling of downstream migrating fish occurs at a rotary screw trap located near the mouth of Shitike Creek in the town of Warm Springs. The screw trap is operated when flows are sufficient, typically from March through June and from October through November. The CTWSRO operates the trap as part of the bull trout study and also to gather juvenile population estimates for steelhead and spring Chinook. Procedures for operating the Shitike Creek screw trap are the same as for the Warm Springs River screw trap. The outplanting monitoring program will collect tissue samples (fin clips) from approximately 1000 juvenile spring Chinook salmon captured at the trap. Passive Integrated Transponder (PIT) tags may also be applied to juvenile Chinook salmon. No additional take of listed species is anticipated as a result of the spring Chinook salmon sampling. The USFWS and the CTWSRO will also conduct snorkel surveys and juvenile sampling in Shitike Creek during July and August. Snorkel surveys will collect observational data on microhabitat preferences, species associations, and species interactions for juvenile salmonids. Tissue samples from age 0 spring Chinook salmon will be collected during the summer. It is anticipated that age 0 spring Chinook salmon will be collected using either minnow trapping or seining techniques. Minnow traps will be baited with tuna or cat food and placed in selected pools for 45 minutes. The pools will be block-netted at the upstream and downstream ends in order to prevent migration into or emigration out of the pool during sampling. After 45 minutes the traps will be removed and the fish in the traps will be sampled. The fish will then be returned to the stream and the block nets will be removed. If seining is used, snorkelers will enter the stream and herd spring Chinook towards a seine, where they will be collected and sampled. During sampling the fish will be held in containers of freshwater, anesthetized with MS-222, counted, and placed into a recovery bucket. Once the fish have fully recovered they will be released back into the stream. Incidental take may occur as a result of harassment or stress associated the minnow traps or with snorkelers herding fish towards a seine. In order to minimize potential take, minnow trapping or seining will not take place in locations where there is a high abundance of listed species.

**Comments:**

nc

**Data source:**

Draft HGMP

**Section 12. Research**

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**12.1 Objective or purpose.**

- 1.) Determine the over-wintering behavior and distribution of fall volitional releases of juvenile hatchery spring Chinook salmon in the Deschutes River.
- [169](#) 2.) Determine the migration behavior of juvenile hatchery fish that leave the Deschutes River system and enter the Columbia River.
- 3.) Investigate hatchery spring Chinook salmon interactions among and between species during over-wintering.

**Comments:**

nc

**Data source:**

Draft HGMP

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**12.2 Cooperating and funding agencies.**

[170](#) Funding for this study is being provided by the USFWS. The United States Geological Survey (USGS) and the CTWSRO are taking the lead in conducting the study.

Comments:

nc

Data source:

Draft HGMP

12.3 Principle investigator or project supervisor and staff.

Principle Investigator: Rachel Wardell

Project Leader: Dennis Rondorf

USGS

Columbia River Research Laboratory

5501 A Cook-Underwood Road

Cook, WA 98605

509-538-2299

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USFWS: Doug Olson

CRFPO

9317 NE Highway 99, Suite I

Vancouver, WA 98665

360-696-7605

CTWSRO: Bob Spateholts

P.O. Box C

Warm Springs OR

541-553-2045

Comments:

nc

Data source:

nds

12.4 Status of stock, particularly the group affected by project, if different than the stock(s) described

in Section 2.

172

nya

Comments:

nc

Data source:

nds

12.5 Techniques: include capture methods, drugs, samples collected, tags applied.

Juvenile hatchery spring Chinook salmon will be collected at a rotary screw trap located at Rkm 5 of the Warm Springs River. The CTWSRO operate the trap as part of the monitoring and evaluation activities associated with the Warm Springs NFH (see Section 2.2.3). Only juvenile hatchery spring Chinook salmon will be used in the telemetry/PIT tag study. Fish will be collected during the fall trapping period, approximately 15 October to 15 November. Fish will be anesthetized using MS-222 and radio tags will be surgically implanted. Radio-tag size will be no larger than 6% tag weight to fish weight ratio. Up to 100 juvenile hatchery spring Chinook will be radio-tagged. Up to 1000 PIT tags will be applied to juvenile hatchery fish caught in the rotary screw trap. In addition, approximately 60 juvenile hatchery spring Chinook will be sampled for ATPase using non-lethal techniques.

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Once fish are tagged they will be tracked throughout the Deschutes River and Columbia River using radio-telemetry and PIT tag monitoring. Three fixed telemetry-stations located on the Deschutes River will monitor movement of radio-tagged fish in the subbasin. Telemetry sites at The Dalles Dam and Bonneville Dam will scan for tagged fish in the mainstem Columbia River. Mobile telemetry receivers and a backpack PIT tag detector will be used for mobile tracking.

Comments:

nc

Data source:

Draft HGMP

12.6 Dates or time periods in which research activity occurs.

174

Collection will occur between 15 October and 15 November in 2002. Tracking of tagged fish will take place from 15 October through January of the following year. The expected project duration is from 2002 through 2006.

Comments:

nc

Data source:

Draft HGMP

12.7 Care and maintenance of live fish or eggs, holding duration, transport methods.

175

Fish will be collected at the rotary screw trap. After fish are anesthetized and tags are implanted, fish will be placed in a recovery container and supplied with a constant flow of river water until they have recovered from the anesthetic. Fish will then be released back



into the Warm Springs River, approximately 5 meters downstream of the rotary screw trap.

Comments:

nc

Data source:

Draft HGMP

12.8 Expected type and effects of take and potential for injury or mortality.

No additional take of listed species beyond that identified in Section 2.2.3 is anticipated as a result of this study. The rotary screw trap is operated as part of the monitoring and evaluation activities associated with Warm Springs NFH (see Section 2). Samples for this study will be taken from fish captured through the normal monitoring activities. Tracking of radio-tagged and PIT tagged fish will take place from the road or in boats and is not expected to result in any take of listed species.

Comments:

nc

Data source:

Draft HGMP

12.9 Level of take of listed fish: number of range or fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

Warm Springs Spring Chinook- Integrated

ESU/Population nya

Activity nya

Location of hatchery activity nya

Dates of activity nya

Hatchery Program Operator nya

Annual Take of Listed Fish by life Stage (number of fish)

Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harrass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	nya	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya

176

181

182

181	<b>Removal (e.g., brookstock (e)</b>	nya	nya	nya	nya
	<b>Intentional lethal take (f)</b>	nya	nya	nya	nya
	<b>Unintentional lethal take (f)</b>	nya	nya	nya	nya
	<b>Other take (specify) (h)</b>	nya	nya	nya	nya
	<i>Fall Chinook - Natural</i>				
	<b>ESU/Population</b>	nya			
	<b>Activity</b>	nya			
	<b>Location of hatchery activity</b>	nya			
	<b>Dates of activity</b>	nya			
	<b>Hatchery Program Operator</b>	nya			
<b>Annual Take of Listed Fish by life Stage (number of fish)</b>					
182	<b>Type of Take</b>	<b>Egg/Fry</b>	<b>Juvenile/Smolt</b>	<b>Adult</b>	<b>Carcass</b>
	<b>Observe or harrass (a)</b>	nya	nya	nya	nya
	<b>Collect for transport (b)</b>	nya	nya	nya	nya
	<b>Capture, handle, and release (c)</b>	nya	nya	nya	nya
	<b>Capture, handle, tag/mark/tissue sample, and release (d)</b>	nya	nya	nya	nya
	<b>Removal (e.g., brookstock (e)</b>	nya	nya	nya	nya
	<b>Intentional lethal take (f)</b>	nya	nya	nya	nya
	<b>Unintentional lethal take (f)</b>	nya	nya	nya	nya
	<b>Other take (specify) (h)</b>	nya	nya	nya	nya
	<i>Steelhead-Integrated</i>				
181	<b>ESU/Population</b>	nya			
	<b>Activity</b>	nya			
	<b>Location of hatchery activity</b>	nya			
	<b>Dates of activity</b>	nya			

**Hatchery Program  
Operator** nya**Annual Take of Listed Fish by life Stage (number of fish)**

Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harrass (a) nya	nya	nya	nya	nya
Collect for transport (b) nya	nya	nya	nya	nya
Capture, handle, and release (c) nya	nya	nya	nya	nya
Capture, handle, tag/mark/tissue sample, and release (d) nya	nya	nya	nya	nya
Removal (e.g., brookstock (e) nya	nya	nya	nya	nya
Intentional lethal take (f) nya	nya	nya	nya	nya
Unintentional lethal take (f) nya	nya	nya	nya	nya
Other take (specify) (h) nya	nya	nya	nya	nya

**Red Band Rainbow Trout- Natural****ESU/Population** nya**Activity** nya**Location of hatchery activity** nya**Dates of activity** nya**Hatchery Program Operator** nya**Annual Take of Listed Fish by life Stage (number of fish)**

Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harrass (a) nya	nya	nya	nya	nya
Collect for transport (b) nya	nya	nya	nya	nya
Capture, handle, and release (c) nya	nya	nya	nya	nya
Capture, handle, tag/mark/tissue sample, and release (d) nya	nya	nya	nya	nya

<b>Removal (e.g., brookstock (e)</b>	nya	nya	nya	nya
<b>Intentional lethal take (f)</b>	nya	nya	nya	nya
<b>Unintentional lethal take (f)</b>	nya	nya	nya	nya
<b>Other take (specify) (h)</b>	nya	nya	nya	nya

**Bull Trout- Natural****ESU/Population** nya**Activity** nya**Location of hatchery activity** nya**Dates of activity** nya**Hatchery Program Operator** nya**Annual Take of Listed Fish by life Stage (number of fish)**

Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
<b>Observe or harrass (a)</b>	nya	nya	nya	nya
<b>Collect for transport (b)</b>	nya	nya	nya	nya
<b>Capture, handle, and release (c)</b>	nya	nya	nya	nya
<b>Capture, handle, tag/mark/tissue sample, and release (d)</b>	nya	nya	nya	nya
<b>Removal (e.g., brookstock (e)</b>	nya	nya	nya	nya
<b>Intentional lethal take (f)</b>	nya	nya	nya	nya
<b>Unintentional lethal take (f)</b>	nya	nya	nya	nya
<b>Other take (specify) (h)</b>	nya	nya	nya	nya

**Round Butte Spring Chinook - Hatchery****ESU/Population** nya**Activity** nya**Location of hatchery activity** nya**Dates of activity** nya

181

182

181

**Hatchery Program  
Operator** nya**Annual Take of Listed Fish by life Stage (number of fish)**

Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harrass (a) nya	nya	nya	nya	nya
Collect for transport (b) nya	nya	nya	nya	nya
Capture, handle, and release (c) nya	nya	nya	nya	nya
Capture, handle, tag/mark/tissue sample, and release (d) nya	nya	nya	nya	nya
Removal (e.g., brookstock (e) nya	nya	nya	nya	nya
Intentional lethal take (f) nya	nya	nya	nya	nya
Unintentional lethal take (f) nya	nya	nya	nya	nya
Other take (specify) (h) nya	nya	nya	nya	nya

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**Red Band Rainbow Trout (Oaks Springs)-Hatchery****ESU/Population** nya**Activity** nya**Location of hatchery activity** nya**Dates of activity** nya**Hatchery Program Operator** nya

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**Annual Take of Listed Fish by life Stage (number of fish)**

Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harrass (a) nya	nya	nya	nya	nya
Collect for transport (b) nya	nya	nya	nya	nya
Capture, handle, and release (c) nya	nya	nya	nya	nya
Capture, handle, tag/mark/tissue sample, and release (d) nya	nya	nya	nya	nya

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181	<b>Removal (e.g., brookstock (e)</b>	nya	nya	nya	nya
	<b>Intentional lethal take (f)</b>	nya	nya	nya	nya
	<b>Unintentional lethal take (f)</b>	nya	nya	nya	nya
	<b>Other take (specify) (h)</b>	nya	nya	nya	nya
	<b>Kokanee- Hatchery</b>				
	<b>ESU/Population</b>	nya			
	<b>Activity</b>	nya			
	<b>Location of hatchery activity</b>	nya			
	<b>Dates of activity</b>	nya			
	<b>Hatchery Program Operator</b>	nya			
<b>Annual Take of Listed Fish by life Stage (number of fish)</b>					
182	<b>Type of Take</b>	<b>Egg/Fry</b>	<b>Juvenile/Smolt</b>	<b>Adult</b>	<b>Carcass</b>
	<b>Observe or harrass (a)</b>	nya	nya	nya	nya
	<b>Collect for transport (b)</b>	nya	nya	nya	nya
	<b>Capture, handle, and release (c)</b>	nya	nya	nya	nya
	<b>Capture, handle, tag/mark/tissue sample, and release (d)</b>	nya	nya	nya	nya
	<b>Removal (e.g., brookstock (e)</b>	nya	nya	nya	nya
	<b>Intentional lethal take (f)</b>	nya	nya	nya	nya
	<b>Unintentional lethal take (f)</b>	nya	nya	nya	nya
	<b>Other take (specify) (h)</b>	nya	nya	nya	nya
	<b>Brown Trout</b>				
181	<b>ESU/Population</b>	nya			
	<b>Activity</b>	nya			
	<b>Location of hatchery activity</b>	nya			
	<b>Dates of activity</b>	nya			

**Hatchery Program  
Operator** nya**Annual Take of Listed Fish by life Stage (number of fish)**

Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harrass (a) nya	nya	nya	nya	nya
Collect for transport (b) nya	nya	nya	nya	nya
Capture, handle, and release (c) nya	nya	nya	nya	nya
Capture, handle, tag/mark/tissue sample, and release (d) nya	nya	nya	nya	nya
Removal (e.g., brookstock (e) nya	nya	nya	nya	nya
Intentional lethal take (f) nya	nya	nya	nya	nya
Unintentional lethal take (f) nya	nya	nya	nya	nya
Other take (specify) (h) nya	nya	nya	nya	nya

182

**Kokanee-Lake Billy Chinook****ESU/Population** nya**Activity** nya**Location of hatchery activity** nya**Dates of activity** nya**Hatchery Program Operator** nya

181

**Annual Take of Listed Fish by life Stage (number of fish)**

Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harrass (a) nya	nya	nya	nya	nya
Collect for transport (b) nya	nya	nya	nya	nya
Capture, handle, and release (c) nya	nya	nya	nya	nya
Capture, handle, tag/mark/tissue sample, and release (d) nya	nya	nya	nya	nya

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<b>Removal (e.g., brookstock (e)</b>	nya	nya	nya	nya
<b>Intentional lethal take (f)</b>	nya	nya	nya	nya
<b>Unintentional lethal take (f)</b>	nya	nya	nya	nya
<b>Other take (specify) (h)</b>	nya	nya	nya	nya

**Brook Trout****ESU/Population** nya**Activity** nya**Location of hatchery activity** nya**Dates of activity** nya**Hatchery Program Operator** nya**Annual Take of Listed Fish by life Stage (number of fish)**

Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
<b>Observe or harrass (a)</b>	nya	nya	nya	nya
<b>Collect for transport (b)</b>	nya	nya	nya	nya
<b>Capture, handle, and release (c)</b>	nya	nya	nya	nya
<b>Capture, handle, tag/mark/tissue sample, and release (d)</b>	nya	nya	nya	nya
<b>Removal (e.g., brookstock (e)</b>	nya	nya	nya	nya
<b>Intentional lethal take (f)</b>	nya	nya	nya	nya
<b>Unintentional lethal take (f)</b>	nya	nya	nya	nya
<b>Other take (specify) (h)</b>	nya	nya	nya	nya

**Cranebows- Integrated****ESU/Population** nya**Activity** nya**Location of hatchery activity** nya**Dates of activity** nya



**Hatchery Program  
Operator** nya**Annual Take of Listed Fish by life Stage (number of fish)**

Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harrass (a) nya	nya	nya	nya	nya
Collect for transport (b) nya	nya	nya	nya	nya
Capture, handle, and release (c) nya	nya	nya	nya	nya
Capture, handle, tag/mark/tissue sample, and release (d) nya	nya	nya	nya	nya
Removal (e.g., brookstock (e) nya	nya	nya	nya	nya
Intentional lethal take (f) nya	nya	nya	nya	nya
Unintentional lethal take (f) nya	nya	nya	nya	nya
Other take (specify) (h) nya	nya	nya	nya	nya

182

**Rainbow Trout Stock 53****ESU/Population** nya**Activity** nya**Location of hatchery activity** nya**Dates of activity** nya**Hatchery Program  
Operator** nya

181

**Annual Take of Listed Fish by life Stage (number of fish)**

Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harrass (a) nya	nya	nya	nya	nya
Collect for transport (b) nya	nya	nya	nya	nya
Capture, handle, and release (c) nya	nya	nya	nya	nya
Capture, handle, tag/mark/tissue sample, and release (d) nya	nya	nya	nya	nya

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Removal (e.g., brookstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	nya	nya
Unintentional lethal take (f)	nya	nya	nya	nya
Other take (specify) (h)	nya	nya	nya	nya

Comments:

Incorporated into Hatchery take table.

text from HGMP 10 October 2002:

No additional take of listed species beyond that identified in Section 2.2.3 is anticipated as a result of this study. The rotary screw trap is operated as part of the monitoring and evaluation activities associated with Warm Springs NFH (see Section 2). Samples for this study will be taken from fish captured through the normal monitoring activities. Tracking of radio-tagged and PIT tagged fish will take place from the road or in boats and is not expected to result in any take of listed species.

nc  
nc

Data source:

Draft HGMP  
nds  
nds

12.10

Alternative methods to achieve project objects.

177

None at this time.

Comments:

nc

Data source:

Draft HGMP

12.11

List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

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Similar species to summer steelhead and bull trout include spring Chinook salmon and resident rainbow trout. No mortality to these species is anticipated from this research project.

Comments:

nc

**Data source:**

HGMP

**12.12 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury or mortality to listed fish as a result of the proposed research activities.**

Non-lethal sampling techniques will be applied. The research project intends to use hatchery spring Chinook salmon to investigate potential impacts of hatchery activities on wild fish populations. The rotary screw trap is operated as part of the monitoring and evaluation activities associated with Warm Springs NFH (see Section 2). This research project will use fish collected during the normal monitoring activities. No additional listed fish will be sampled or handled as a result of the research project. Take estimates for steelhead resulting from the monitoring and evaluation program in the Warm Springs River are estimated in Take Tables.

**Comments:**

nc

**Data source:**

nds

**Section 13. Attachments and Citations**

**13.1 Attachments and Citations**

text from HGMP 10 October 2002:

Cates, B. C. 1992. Warm Springs National Fish Hatchery evaluation and anadromous fish study on the Warm Springs Indian Reservation, 1975-1989. Progress Report. U. S. Fish and Wildlife Service, Lower Columbia River Fisheries Resource Office, Vancouver, Washington.

Cederholm, C. J. 1999. Pacific salmon carcasses: Essential contributions of nutrients and energy for aquatic and terrestrial ecosystems. Fisheries 24 (10): 6-15.

CRiS (Columbia River Information System) Database, Stephen Pastor Database Manager (Stephen\_Pastor@fws.gov), United States Fish and Wildlife Service, Columbia River Fisheries Program Office, Vancouver, Washington. <http://columbiariver.fws.gov>

CTWSRO (Confederated Tribes of the Warm Springs Reservation of Oregon) and USFWS (United States Fish and Wildlife Service), 2002. Warm Springs National Fish Hatchery Operational and Implementation Plan 2002-2006. United States Fish and Wildlife Service, Columbia River Fisheries Program Office, Vancouver, Washington.

Dambacher, J. M. , 2002. Project Report: Relative abundance of juvenile Chinook salmon in Shitike Creek, of the Confederate Tribes of the Warm Springs Reservation, Oregon. Oregon Department of Fish and Wildlife, Corvallis, OR.

Groot, C. and L. Margolis. 1991. Pacific salmon life histories. UBC Press, University of British Columbia, Vancouver, British Columbia.

IHOT (Integrated Hatchery Operations Team), 1996. Operations Plans for (USFWS) anadromous fish production facilities in the Columbia River Basin. Annual Report to the Bonneville Power Administration, Portland, Oregon.

Lindsay, R. B., B. C. Jonasson, R. K. Schroeder, and B. C. Cates, 1989. Spring Chinook salmon in the Deschutes River, Oregon. Oregon Department of Fish and Wildlife, Information Report 89-4, Portland, Oregon.

McNeil, W. J. and D. C. Himsworth. 1980. Salmonid ecosystems of the North Pacific. Oregon State University Press and Oregon State University Sea Grant College Program, Corvallis, Oregon.

NMFS (National Marine Fisheries Service). 1999a. Biological Assessment for Mitchell Act Hatchery Operations. Hatcheries and Inland Fisheries Branch, Portland, Oregon.

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Olson, D. E., B. C. Cates, and D. H. Diggs, 1995. Use of a national fish hatchery to complement wild salmon and steelhead production in an Oregon stream. American Fisheries Society Symposium 15:317-328.

Olson, D. E., and B. Spateholts, 2001. Hatcheries harvest and wild fish . . . an integrated program at the Warm Springs National Fish Hatchery, Oregon. In: Proceedings of the 52nd Northwest Fish Culture Conference, December 2001. U. S. Fish and Wildlife Service, Vancouver, Washington. <http://columbiariver.fws.gov>

Olson, D. E. and S. Pastor, 1998. Warm Springs National Fish Hatchery: An account of summer steelhead returns and strays in the Warm Springs River. U. S. Fish and Wildlife Service, Columbia River Fisheries Program Office, Vancouver, Washington.

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Oregon Department of Fish and Wildlife (ODFW), 1997. Lower Deschutes River Subbasin Management Plan. Mid-Columbia Fish District, Oregon Department of Fish and Wildlife, The Dalles, Oregon.

Piper, R. G., I. B. McElwain, L. E. Orme, J. P. McCraren, L. G. Fowler, and J. R. Leonard, 1982. Fish hatchery management. United States Department of Interior, Fish and Wildlife Service, Washington D. C.

USFWS (United States Fish and Wildlife Service). 1998. Intra-Service Section 7 biological evaluation form for listed bull trout and Warm Springs National Fish Hatchery operations.

Wardell, R. E., N. S. Adams, D. W. Rondorf, C. Brun, and R. Dodson, 2002. Feasibility study to determine the distribution of juvenile hatchery spring Chinook salmon in the Deschutes River and their potential effect upon the aquatic community, Annual Report for 2000. United States Geological Survey, Biological Resources Division, Columbia River Research Laboratory, Cook, Washington.  
<http://columbiariver.fws.gov>

**Comments:**

nc

**Data source:**

nds

## **Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY**

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### **14.1 Certification Language and Signature of Responsible Party**

"I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

**Name, Title, and Signature of Applicant:**

Certified by \_\_\_\_\_ Date: \_\_\_\_\_